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Photo courtesy of California Redwood Assn.

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Journal of Forestry

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The Society's Important Task

Editorial

Henry Schmitz

AMERICAN education, both public and private, at all levels always has had to face difficult problems and to make difficult decisions. The past, however, is only a prelude to the future. The major problems and the major decisions lie ahead. These decisions may well determine whether or not the youth of the nation ten or fifteen years hence will enjoy the same opportunities for obtaining high-quality higher education as did the youth of the nation ten or fifteen years ago.

Much has been said and written about the so-called tidal wave of students that will be lapping at college admission offices in the immediate future. It is an established fact that during the past ten years the national college enrollment has risen from two million five hundred thousand, to three million and it seems reasonably certain that by 1965 it will increase to four and one-half million. The ten-year period after 1965 will undoubtedly show increases of even a greater magnitude.

Quite aside from the problems of staffing, it seems reasonably certain that the physical space needed to accommodate these students will have to be about twice as great as the space now devoted to higher education. Bluntly stated, within the next ten or fifteen years the American people will have to build as many buildings for higher education as they have managed to build for educational institutions since the landing of the Pilgrims. This will necessitate the expenditure of hundreds of millions of dollars.

Traditionally, the American people have supported higher education liberally. Even though there are indications from the Atlantic to the Pacific that the tax payer is becoming weary, there is little evidence that the basic financial needs of higher education will not be met adequately in the future. In several regions, for example in the South, the Northeast, and the West, there are signs that legislatures would like to avoid, if possible, unnecessary educational developments in their respective universities and that they wish to utilize the pooled educational resources of a region.

HENRY SCHMITZ

A good example of the pooling of regional educational resources in the health sciences and in other fields is provided by the Western Interstate Commission for Higher Education. The western states created the commission by interstate compact. The goal is to avoid unnecessary duplication, save money, and to increase educational opportunity for western youth. Through WICHE a young man residing in a state that does not have a medical school can be considered for admission to a medical school in another state on about the same basis as a resident of the state having a medical school. The sending state, not the student, pays the larger share of the cost of providing the educational program for that student.

Under this arrangement every one benefits—the states, the students, and the receiving schools. The sending states have been spared the cost of building expensive professional schools they are not yet ready to support and use efficiently Students have gained tuition savings plus increased opportunities for admission to professional schools of top quality. The schools taking the students receive payments more nearly approximating their costs for out-of-state students.

There is no reason why the principle of interstate cooperation could not be extended to forestry education if necessary. However, there are few indications as yet that a good student cannot gain admission as a nonresident to some accredited school of forestry at tuition rates that are not prohibitively high. If the time comes when the admission of nonresident students to the existing schools of forestry

Editor's note. Dr. Schmitz is president emeritus of the University of Washington. He is a former president of the Society of American Foresters and editor-in-chief of the JOURNAL OF FORESTRY.

is greatly circumscribed or restricted, the solution to the problem may well be found through a program of interstate cooperation rather than by establishing more new forestry schools.

In forestry education on the national level, we have witnessed the reverse trend. Forestry schools have been developed or are now contemplated in many universities. In 1958, for example, three new four-year programs and two two-year programs were established in the United States.

As a broad generality, it seems quite evident that there are already too many forestry schools in the United States and that the development of additional schools, often inadequately financed, is both unnecessary and unwise.

There seems to be a shocking lack of recognition in some university circles about what it costs to establish and maintain a first-class forestry school under present operating conditions. Any administrator contemplating the development of a forestry school should expect to expend not less than one million dollars for a physical plant, five hundred thousand dollars for equipment and field facilities, and be ready to provide an annual budget for salaries and operations of approximately one hundred thousand dollars.

Furthermore, it can be said with a high degree of truth that the existing schools, accredited and nonaccredited, probably could double their present enrollments. This expansion would cost additional money to be sure, but not nearly as much as the cost involved in establishing new schools to take care of additional students.

Looking ahead it seems certain that the additional billions of dollars that will be needed to furnish higher educational opportunities in the immediate future will not come easily. As the demands for additional support for higher education increase, as they must, legislatures will become more and more critical of unwise or unnecessary educational developments.

Foresters themselves are largely responsible for whipping up the pressures to establish a new forestry school at a given university. With all of the demands made on a president, or on a board of regents for the available education dollar, most university administrators enter into new programs reluctantly. Often the pressure becomes irresistible and a new forestry school is born, needed or not, or a two-year program is extended to a four-year program irrespective of the merits of the case.

The solution to the problem rests largely with ourselves. If we will not solve it, if university administrators will not solve it, legislatures may well do so. This may not be a desirable solution, it may be slow, but ultimately it will be effective.

In the meantime, the Society has an inescapable responsibility. It should raise the standards for accreditation of schools of forestry. This will require courage and good judgment on the part of the officers and the understanding and the support of a majority of the members of the Society. The prestige and the competence of a professional group are determined in large measure by the quality of the schools that produce the group. Even if the Society may not always be able to prevent the establishment of a new forestry school it certainly need not, and indeed should not, give it an accredited rating until it meets certain standards of excellence.

It must always be recognized, too, that what might have been good quality forestry education ten years ago may be substandard forestry education today. The art and the science of forestry practice like the art and the science of engineering and medical practice are changing with ever increasing speed. The Society's requirements for accreditation must reflect these changes if accreditation is to continue to be meaningful.

The Society has no more important task than that of preventing the dilution of the professional competence of its membership. This task—difficult at best—will become impossible if the Society gives accredited status to other than first-class schools of forestry.

Half a Century of Research—Fort Valley Experimental Forest 1908-1958[1]

Edward M. Gaines and Elmer W. Shaw

FIFTY YEARS AGO in 1908, the U. S. Forest Service launched its research program in forest management on the Fort Valley Experimental Forest near Flagstaff, Arizona. This was the first scientific venture of its kind in America—now the oldest.

From the beginning the chief aim of research here has been to work out better ways of managing ponderosa pine in the Southwest. Already, we have learned much. But to keep pace with the advance of science and industry, we need to know more. For example, in 1953 the pulp industry came to Flagstaff, bringing new opportunities for more intensive forest management. In the broader picture, recent forecasts presented in "Timber Resources for America's Future" indicate that the nation will need all the wood we can grow. To help meet this rising demand, we must intensify our research and improve our management practices.

The historical background of Fort Valley, highlights of the research results, and the current program are presented in this article.

Facts About Fort Valley

The headquarters for the Fort Valley Experimental Forest consisting of five separate blocks aggregating 4,700 acres is about 9 miles northwest of Flagstaff, Arizona. Elevations range from 6,700 to 8,000 feet. The forest type is pure ponderosa pine. The experimental forest is located within the most extensive pure stand of that type in the United States.

The climate is cool and rather dry but favorable for tree growth. Annual precipitation averages 23 inches. Mean annual temperature is 43°F. In summer, temperatures usually reach 90°; in the average winter, they drop to 15° below zero. Topography is nearly level to rolling. Soils are mostly residual, very stony, sandy loams; some have high cinder content. Geologically, the area contains tertiary volcanics (basalts, cinders, and other materials).

Personnel and History

The name of G. A. "Gus" Pearson is indelibly stamped on forest management research at the Fort Valley Experimental Forest. Pearson started the work in 1908 and guided it until his retirement in 1945. Up to his death January 31, 1949, he continued working on his comprehensive monograph, "Management of Ponderosa Pine in the Southwest."

Pearson was the first to acknowledge the contribution of many associates who helped at one time or another in the program at Fort Valley. The list includes many who would be prominent in a "Who's Who" in American forestry. Raphael Zon and S. T. Dana, chief and assistant chief of silvical investigations in the Forest Service, and T. S. Woolsey, Jr., assistant regional forester (timber management) in the Southwest Region, took active parts in early planning.

Others who have participated actively, more or less in chronological order, include:
Harrison D. Burrall, J. S. Boyce, Max H. Foerster, Harold H. Greenamyre, Alexander J. Jaenicke, Norman W. Scherer, Enoch W. Nelson, Clarence F. Korstian, Hermann Krauch, Harold S. Bettes, S. S. Van Boskirk, Joseph C. Kircher, Emanuel Fritz, Lenthall Wyman, Ferdinand W. Haasis, Bert Lexen, E. M. Hornibrook, Elbert H. Little, Edward C. Martin, Frank W. Wadsworth, Geraldine Peterson, George S. Meagher, Francis R. Herman, Edward M. Gaines, M. M. Larson, L. P. Heidmann.

This list may not be complete; early records are not always clear as to who worked in various capacities. Nor is the record clear as to the contributions made by personnel of the Southwest Region of the Forest Service. Most of the assistant regional foresters in timber management have been helpful, as have been Coconino National Forest supervisors and many of their staffmen and rangers.

The forest was first called the "Coconino Experiment Station," then in 1911 was renamed the Fort Valley "Experiment Station." In the years following, a distinction developed between the "Experiment Station"—the group of men conducting research—and the "Experimental Forest"— the area on which part of the research was done. In 1927, forest and range research throughout the Southwest was consolidated administratively as the Southwestern Forest and Range Experiment Station, with Fort Valley as a branch station. Pearson was director of the new station from its beginning until 1935, when he gave up the position in order to devote all his time to ponderosa pine research. General supervision and direction of research at Fort Valley has rested with sub-

THE AUTHORS are, respectively, research center leader and editor, Rocky Mountain Forest and Range Experiment Station, Forest Service, U. S. Department of Agriculture, with central headquarters at Colorado State University in Fort Collins. Mr. Gaines is stationed at Arizona State College in Flagstaff, Mr. Shaw at Fort Collins.

[1] *Editor's note.*—This article, in slightly longer form, was published in October, 1958 as Station Paper No. 38 of the Rocky Mountain Forest and Range Experiment Station, Forest Service, U. S. Department of Agriculture. It is not the policy of the JOURNAL to republish material. That policy has been set aside in this instance because it was the opinion of the editors that the article is of special interest since it not only records the establishment, but also lists the major accomplishments, of the first forest experiment station in the United States.

sequent directors of the Southwestern Station: Arthur Upson (1935-42) and Raymond Price (1942-53). The Southwestern Station was combined with the Rocky Mountain Forest and Range Experiment Station in 1953, and Price has continued as director of the enlarged Rocky Mountain Station.

The present research program at Fort Valley is conducted by Rocky Mountain Station personnel stationed on the campus of Arizona State College at Flagstaff.

As this history shows, an impressive roster of foresters have worked at Fort Valley over the years. Several have come and gone in rapid succession. Lack of funds, equipment, and personnel has always limited the Fort Valley research program. But in spite of these limitations, a great deal has been accomplished and much has been learned about ponderosa pine silviculture and management.

The Research Picture

The accumulated results of 50 years of forest research at Fort Valley are too numerous to include here in any detail. Most of these findings have been summarized in Pearson's monograph: "Management of Ponderosa Pine in the Southwest."

Ecology and silvics.—Many of the silvical characteristics of southwestern ponderosa pine have been partially worked out at Fort Valley. For example, it has been found that:

1. Occurrence of ponderosa pine is limited by rainfall at lower elevations but by temperature at higher altitudes.
2. In virgin stands, ponderosa pine tends to grow in small, even-aged groups.
3. Ponderosa pine is not exacting in its soil requirements, but it makes best growth on soils whose physical properties provide the best moisture conditions.
4. Summer rain is important for germination and survival of seedlings, but soil moisture from winter storms sustains growth of older trees.
5. Sunlight influences growth; best tree form is developed in partial side shade. Moisture is important in determining total growth, especially as trees grow older and larger.
6. Growth of an individual immature tree is determined more by its position relative to competing trees than by its apparent vigor class. Immature trees of all vigor classes respond well to release from competition.
7. Height growth is practically complete by mid-July each year. Diameter growth usually continues through August (depending on summer rains) and needles continue growth into early fall.
8. Mature trees in virgin stands are mostly less than 300 years old.

Regeneration.—Lack of advance reproduction in 1908 was the main reason for beginning research at Fort Valley. Although much has been learned since then, techniques for insuring adequate regenerations at regular intervals are still unavailable.

Only once since 1908 has a really good stand of natural reproduction been established. That was in 1919 (Fig. 1). All the basic requirements for natural regeneration were met that year: (1) a bumper seed crop the fall before; (2) favorable weather (especially rainfall) for early germination and survival; (3) favorable seedbed

FIG. 1.—*Above*, View of Fort Valley headquarters in 1916. Note the open parklike stand of ponderosa pine.
Below, The same view 26 years later. Natural regeneration almost obscures the headquarters buildings.

FIG. 2.—The Wing Mountain plot in 1939 just before its second logging. This plot has the distinction of being one of the first areas in the West from which two crops of timber have been harvested by the U. S. Forest Service. It was first logged in 1909.

FIG. 3.—The same plot as shown in Fig. 2 after the second logging. This group of trees will provide 4 more cuts at intervals of 20 to 30 years. By the time the last trees have been removed, some of the young growth in the background will be ready for harvest.

and limited competition from grass and weeds, resulting from heavy grazing in preceding years.

Studies now in progress include methods of reducing competition from grass and weeds, and of controlling seed enemies so that natural seeding will have a better chance of producing new trees.

Artificial regeneration (planting of nursery-grown trees, or sowing seed directly) has been only partially successful. Basic recommendations, developed at Fort Valley, include:

1. Use only local seed, or first-grade seedlings grown from local seed.
2. Plant only on sites where ponderosa pine has grown in the past.
3. Avoid areas of heavy competition from grass or weeds, or control the competition.
4. Protect seed from rodents and birds, and seedlings from browsing animals.

Further research will be needed to develop these general principles into successful techniques for re-establishing a forest on denuded areas.

Growing the young forest.—As a young timber stand matures, its maximum value can be developed through special treatments. Recommendations developed from Fort Valley research should be applied to even-aged groups of trees as follows:

1. When the young stand is well established (most trees 6 feet or more tall), thin to 600 trees per acre.
2. When the stand reaches pulpwood size (average tree 7 inches d.b.h.) thin to a reserve of 80 square feet of basal area per acre.
3. Prune about 100 of the best reserve trees to the acre to a height of 18 feet.
4. Re-thin the stand at about 20-year intervals, reserving 80 square feet of basal area per acre at each operation, until the stand is ready for harvest.
5. Large worthless trees may be poisoned with either sodium arsenite or the safer ammonium sulfamate (Ammate).

Since this thinning regime was developed from very limited data, confirmation and refinement are needed.

Management systems.—From a study of several systems, including group selection, light selection, scattered seed tree, favoring dominants, and salvage, another was developed, which is now recommended for application in southwestern ponderosa pine. It is called "improvement selection." The objective is to place the stand in a vigorous growing condition and to build up an effective growing stock by improving spacing in all sawtimber-sized groups; retaining the best quality stems for future growth; and removing declining, poor-risk, diseased, defective, or poor-quality trees.

The improvement-selection principles are being applied to most managed forests in the Southwest. Marking rules for the first one or two cuts in virgin forests, and for the first re-cut in old cutover forests have been developed (Figs. 2 and 3). The current Fort Valley research program includes the development of additional techniques for subsequent cutting, which will be needed to provide orderly harvest for currently mature trees and the conversion of the forests to balanced age groups.

It is possible that even-aged management may in the long run be more productive than selection management. The theory needs to be tested in future studies.

Growth and development of managed stands. — Management systems are evaluated in part by the growth and development of the stands left after cutting. At Fort Valley all trees 8 inches d.b.h. and larger have been tagged and remeasured at 5-year intervals on 11 large plots (72 to 320 acres each) that were cut under various systems, and on one virgin plot. It is the plan to continue measurements

indefinitely at 10-year intervals on seven cutting plots and the virgin plot.

From the past measurements, equations for estimating growth and mortality following cutting have been derived.

Control of damaging agents.— Several of the enemies of ponderosa pine can be controlled to some extent through special management practices. Among those studied at Fort Valley are:

1. Wind and lightning, which together account for about 70 percent of the mortality in both virgin and managed stands. Young thrifty trees are much more resistant than old overmature ones. Application of improvement selection greatly reduces the loss through cutting the most susceptible (poor-risk) trees.

2. Bark beetles of various species are third in causing mortality. Improvement selection again reduces losses by cutting poor-risk trees.

3. Dwarfmistletoe, the most serious disease, kills some trees, badly deforms others, and reduces growth of severely infected trees. Control through stand management is being studied currently with the aid of station pathologists.

4. Red rot destroys as much as 20 percent of the usable wood in virgin stands. Proper thinning and pruning can practically eliminate the loss in managed forests.

5. Limb rust is a slow but certain killer; fortunately it attacks only occasional trees. Cutting cycles of 20 years or less under the improvement-selection system make it possible to salvage most infected trees before they die.

6. Livestock and deer kill or damage seedlings. The need to control domestic livestock is obvious. Deer-repellent chemicals are being studied at Fort Valley.

Most other enemies must be met by special control measures. The seriousness of many of these has been established and necessary research is being carried out elsewhere by other research groups.

Fire is the best known forest enemy. Prevention, including fuel-reduction measures, has been and is being studied by other Forest Service researchers. Guides to salvage fire-damaged forests have been developed.

Porcupines and seed-eating rodents are under study by the U. S. Fish and Wildlife Service.

The seriousness of certain other enemies is yet to be established. Current studies at Fort Valley will shed light on the damage done by Abert squirrels and cone beetles. Tip moths should also be studied.

A Footnote to History

The recent celebration of the fiftieth anniversary of the establishment of the Fort Valley Experimental Forest interested me greatly because of my early connection with the station. In April, 1908, I was sent by the Washington, D. C. office of the Forest Service to the Southwest to find a site for the first of a system of forest experiment stations which were about to be established under a new and expanded program of research. The next few months were spent in a reconnaissance, mostly on horseback, of promising sites in northern New Mexico and Arizona. Fort Valley offered a combination of advantages which made it my first choice. G. A. Pearson joined me in July, and Raphael Zon in August.

The next year a similar assignment in California, which involved traversing the greater part of the Sierras on horseback, resulted in the selection and subsequent establishment of the Feather River Experiment Station near Quincy.

SAMUEL T. DANA

Selected List of Publications

Some 100 articles have been published covering the work at Fort Valley. By far the most important is:

PEARSON, G. A. 1950. Management of ponderosa pine in the Southwest. U.S. Dept. Agric. Agric. Monog. 6, 218 pp., illus.

This bulletin reviews much of the work done at Fort Valley from 1908 through 1946. Earlier publications of historic importance, or that present results not covered in the monograph are:

BETTS, H. S. 1912. Possibilities of western pines as a source of naval stores. U. S. Forest Serv. Bul. 116, 23 pp., illus.

HAASIS, FERDINAND W. 1923. Frost heaving of western yellow pine seedlings. Ecol. 4: 378-390, illus.

KRAUCH, HERMANN. 1926. The determination of increment in cut-over stands of western yellow pine in Arizona. Jour. Agric. Res. 32: 501-541, illus.

LEXEN, B. R. 1935. Some factors influencing the yield and mortality of ponderosa pine in the Southwest. Jour. Agric. Res. 50: 777-787, illus.

PEARSON, G. A. 1910. Reproduction of western yellow pine in the Southwest. U. S. Forest Serv. Cir. 174, 16 pp.

————. 1923. Natural reproduction of western yellow pine in the Southwest. U. S. Dept. Agric. Bul. 1105, 144 pp., illus.

————. 1924. Studies in transpiration of coniferous tree seedlings. Ecol. 5: 340-347, illus.

————. 1931. Forest types in the Southwest as determined by climate and soil. U. S. Dept. Agric. Tech. Bul. 247, 144 pp., illus.

————. 1940. Timber stand improvement in the Southwest. U. S. Fed. Security Agency, Civ. Conserv. Corps Forestry Pub. 6, 12 pp., illus.

————. 1940. Reforestation in the Southwest by CCC camps. U. S. Fed. Security Agency, Civ. Conserv. Corps Forestry Pub. 7, 14 pp., illus.

————. 1942. Herbaceous vegetation a factor in regeneration of ponderosa pine. Ecol. Monog. 12: 315-338, illus.

————. 1942. Improvement selection cutting in ponderosa pine. Jour. Forestry 40: 753-760, illus.

————. 1944. Applied genetics in forestry. Sci. Monthly 58: 444-453, illus.

———— and ARTHUR C. MCINTYRE. 1935. Slash disposal in the ponderosa pine forests of the Southwest. U. S. Dept. Agric. Cir. 357, 29 pp., illus.

———— and R. E. MARSH. 1935. Timber growing and logging practice in the Southwest and in the Black Hills region. U. S. Dept. Agric. Tech. Bul. 480, 80 pp., illus.

Publications since Agriculture Monograph No. 6 include:

GAINES, EDWARD M., and E. S. KOTOK. 1954. Thinning ponderosa pine in the Southwest. U. S. Forest Serv. Rocky Mountain Forest and Range Expt. Sta. Sta. Paper 17, 20 pp., illus. [Processed.]

HERMAN, F. R. 1954. A guide for marking fire-damaged ponderosa pine in the Southwest. U. S. Forest Serv. Rocky Mountain Forest and Range Expt. Sta. Res. Note 13, 4 pp. [Processed.]

————. 1954. Use of Ammate crystals for poisoning ponderosa pine in stand improvement. U. S. Forest Serv. Rocky Mountain Forest and Range Expt. Sta. Res. Note 14, 5 pp. [Processed.]

MEAGHER, GEORGE. 1950. Reproduction of ponderosa pine. Jour. Forestry 48: 188-191.

PEARSON, G. A. 1949. Management of cut-over land in the interior ponderosa pine type. Jour. Forestry 47: 172-178, illus.

———. 1951. A comparison of the climate in four ponderosa pine regions. Jour. Forestry 49: 256-258, illus.

Looking Forward

The work at Fort Valley is not finished. True, many studies have been completed. Others are still in progress and new ones are being added as new vistas unfold.

Research, like the forest itself, is a growing thing. It looks to the future. It moves forward with the times. Or to paraphrase Tennyson:

"All research is an arch wherethrough gleams that untraveled world, whose margins fade forever and forever as we move."

A Half-Century of Forestry Training at Itasca, Minn.

A half-century of field forestry training was observed on July 31 and August 1 at the University of Minnesota's Lake Itasca Forestry and Biological Station. In attendance were 200 alumni of the School of Forestry and their families and friends. The celebration highlighted progress in forestry education and research and honored persons who contributed significantly to the development of the station.

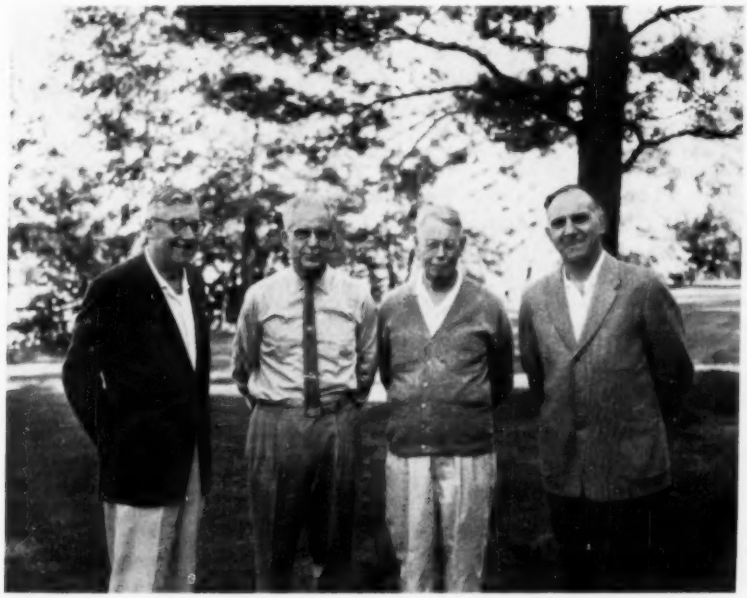
Beginning in 1909 forestry students at the University have gone to Itasca State Park for a field training period of six weeks. The summer camp is believed to be America's oldest outdoor training center for forestry education in continuous operation.

Frank H. Kaufert, director of the School of Forestry, was master of ceremonies. A history of the park was presented by John Dobie of the Minnesota Game and Fish Department and author of the book *The Itasca Story*.

Among the speakers were Richard C. Newman, president of the Forestry School Alumni Association; Charles Lewis, Harry Bartelt, and Howard E. Olson, alumni; and Henry Clepper, representing the Society of American Foresters.

Dedication plaques and photographs were unveiled in honor of the three founders of the Itasca forestry session: Samuel B. Green, Edward G. Cheney, and John P. Wentling. The three builders of the Itasca campus facilities were similarly honored: Dr. T. Schantz-Hansen, Walter W. Nelson, and Erick Wallin.

The University's Outstanding Achievement Award was awarded to Walter H. Swanson, vice president for research and development of Kimberly-Clark Paper Company.



IN ATTENDANCE at the 50th anniversary of forestry field training at Itasca State Park, *L* to *R*: Henry Clepper, executive secretary, Society of American Foresters, Prof. Randolph M. Brown, Prof. emeritus J. H. Allison, and Director Frank H. Kaufert of the University of Minnesota School of Forestry.

A Comparison of 6 Inch Planigon Lens with Conventional 8.25 Inch Lens Aerial Photography for Forestry Purposes

M. P. Meyer
and L. H. Trantow

AN AERIAL CAMERA lens of a focal length other than 8.25 inch is seldom specified for forestry aerial photography—any exception usually being 12 inches. In view of the excessive radial displacement and blind spots which often result, it is understandable why the 6 inch lens is not used when large scale forest photography is desired or where there is more than slight to moderate topographic variation. In the absence of critical surface relief, however, and where relatively small scales of photography (i.e., 1/15,840 to 1/20,000) are desired, there seemed to be no reason why a 6 inch focal length would not produce suitable photography. As a matter of fact, it was considered possible that the products of certain 9×9 format 6 inch lenses might prove to be superior for the following reasons: (1) due to the greater desirability of the 6 inch lens for most engineering photography and mapping, such near-distortion-free lenses as the Aviogon, Planigon, and Topogon have been developed to a level of quality far exceeding that of the 9×9 format 8.25 inch lenses normally used for forest interpretation purposes, and (2) the increased displacement might make small differences in image height more readily discernible and measurable.

Another objective of the study, in addition to comparing the conventional 8.25 inch lens with the near-distortion-free 6 inch lens, was to ascertain, if possible, whether or not scale changes in the range 1/15,840 to 1/24,000 would affect the accuracy of forest measurements from such 6 inch photography. Similar tests by Johnson (*1*) and Pope (*2*) involving conventional lenses of longer focal length with scale ranges of 1/5,000 to 1/20,000 and 1/2,500 to 1/20,000, respectively, had revealed no significant differences in the mean error of tree height measurement in the 1/10,000 to 1/20,000 scale range.

THE AUTHORS are associate professor, University of Minnesota School of Forestry, and assistant general manager of the Santa Barbara Plant, Mark Hurd Aerial Surveys, Inc., respectively. They are deeply indebted to Professor Chernggjiann Shiue of the University of Minnesota School of Forestry for his assistance in the statistical design and analysis of this experiment. This paper is published as Scientific Journal Series No. 3996 of the Minnesota Agric. Expt. Sta., Institute of Agriculture, St. Paul, Minn.

TABLE 1.—TEST PHOTOGRAPHY DESCRIPTIONS

Photo code	Lens (9x9 format)	Exposure and development	Scale	Time of exposure
A	6" Planigon	under-exposed, over-developed	1/15,840	10:15 AM, Sept. 16
B	6" Planigon	normal	1/15,840	10:11:30 AM, Sept. 27
C	6" Planigon	normal	1/20,000	
D	6" Planigon	normal	1/24,000	
E	8.25" conventional	normal	1/15,840	

Test Procedure

In 1957, at the beginning of autumnal leaf coloration, panchromatic minus-blue photography of the University of Minnesota Cloquet Forest Research Center in northern Minnesota was flown by Mark Hurd Aerial Surveys, Inc. Both a conventional 8.25 inch and a 6 inch Planigon lens were employed, and the photographs were exposed in such a manner as to have the flight lines and photo centers of all photography coincide as nearly as possible—particularly on the photo whose effective area was to contain the test plots. This insured that any test plot selected on the control photography would fall in approximately the same geometric position on all other photography used (Table 1).

TABLE 2.—TEST PLOT DESCRIPTIONS
(Based on ground measurements)

Plot	Species	Mean ht.[1] (feet)	Mean crown dia.[1] (feet)
1	Jack pine	39.3	14.0
2	Jack pine	59.9	12.5
3	Black spruce	39.0	9.5
4	Norway pine	43.3	8.5
5	Aspen-birch	50.1	11.0
6	Spruce-fir	40.1	8.5
7	Aspen-birch	54.0	15.5
8	Jack pine	47.0	8.0
9	Norway pine	89.2	14.5

[1]Dominant and codominant trees.

Nine circular one-acre test plots (117.8 foot radius), well-distributed over the effective area of the center photo of the test triplicates, were selected on the basis of heterogeneity of photo image characteristics such as tone, texture, size, pattern and density. These plots, all of which were located in locally typical commercial forest types, were measured on the ground for the average height and crown diameters of the dominant and codominant trees (Table 2).

Fourteen interpreters, all with previous training, were given approximately 18 hours of practice in the use of conventional parallax wedges and dot type crown diameter scales. At the close of the practice period each was provided with a complete set of the test photographs upon which the nine test plots had been designated and numbered. The following measurements were made on each plot on each

type of photography by each interpreter: (1) four parallax measurements of the average height of dominant and codominant trees, and (2) at least three diameter measurements of average dominant and codominant tree crowns. Upon completion of the measurements by the interpreters, the mean algebraic differences between photographic and ground measurements were calculated. These mean differences in tree height and crown diameter measurement, expressed in feet, provided the basic data for the analyses which follow.

Results

Parallax tree height measurements.—To determine the variances due to the influence of photography involved, separate analysis of variance tables was set up for each individual type of photography. The five respective variances (mean squares for plot-interpreter interaction) were computed and subjected to Bartlett's Test of Homogeneity (*3*). These variances were found to be heterogeneous (see Table 3) indicating that conventional methods of analysis of variance between types of photography were not applicable. To determine the relationships between the respective mean difference levels of the various types of photography, the F-test was used. The results of this test, summarized in Table 4, require rejection of the hypothesis of homogeneity among mean difference levels between types of photography tested.

Normally exposed and developed 1/15,840 scale 6 inch photography was found to be superior to the 8.25 inch control photography of the same scale in that the former produced measurement errors having a smaller mean and a smaller variance. Oddly enough, the mean differences of height measurement produced on the 6 inch photography decreased progressively and significantly as the photo scale was reduced from 1/15,840 to 1/24,000. At the same time, however, the corresponding variances increased progressively and significantly as the photo scale was reduced.

Crown diameter measurements.—As in the case of the parallax tree height measurements, there was no way of knowing whether or not the variances of the differences were homogeneous. Consequently, the same procedures of analysis applied to the tree height measurement were employed. Again, Bartlett's Test revealed heterogeneity, however, the computed F-test (see Table 4) was small enough to be random and hypothesis of homogeneity among the mean differences of measurement could be accepted.

The normally exposed and developed 1/15,840 scale 6 inch photography produced differences of measurement having a smaller mean and a smaller variance than did the 8.25 inch control photography. These differences, however, were not found to be significant. As the 6 inch photography was reduced in scale from 1/15,840 to 1/24,000, the mean difference of measurement increased slightly, although not significantly. The variances of the differences, however, increased progressively and significantly as the scale decreased.

Photo interpreter reactions.—In previous studies by Meyer (*4*) and Meyer and Trantow (*5*), the reactions of the interpreters were in many cases found to correlate quite well with the results of the tests of the photography concerned. Therefore, as each interpreter completed the measurements on a plot, he was asked to rank the five types of photography as to which he considered Best, Intermediate and Poorest for that particular plot. Figure 1 indicates a definite preference for the 1/15,840 scales, with the exception of the 6 inch photography which had been under-exposed and over-developed. The latter photography, along with that having the 1/24,000 scale, received the poorest rating of the five types of photography tested.

TABLE 3.—VARIANCES OF THE MEAN DIFFERENCES OF HEIGHT AND CROWN DIAMETER MEASUREMENT

Photography	Variance	Relationship to variance of other types of photography[1]
Parallax height measurements		
D (6″, 1/24,000)	110.1542	Sig. higher than E & B
C (6″, 1/20,000)	106.2415	Sig. higher than E & B
A (6″, 1/15,840)[2]	84.7647	Sig. higher than B
E (8¼″, 1/15,840)	62.8293	Sig. higher than B
B (6″, 1/15,840)	26.9219	
Crown diameter measurements		
D (6″, 1/24,000)	21.7923	Sig. higher than C, E, B & A
C (6″, 1/20,000)	15.2699	Sig. higher than E, B & A
E (8¼″, 1/15,840)	10.7793	
B (6″, 1/15,840)	8.8333	
A (6″, 1/15,840)[2]	8.1232	

[1]Sig. calculated at the 5% level.
[2]Under-exposed and over-developed.

TABLE 4.—MEAN DIFFERENCE OF PARALLAX HEIGHT AND CROWN DIAMETER MEASUREMENT

Photography	Mean difference	Results of F′ test
Parallax height measurements		
E (8¼″, 1/15,840)	−15.97	Mean errors differ significantly
A (6″, 1/15,840)[1]	−14.36	
B (6″, 1/15,840)	−12.90	
C (6″, 1/20,000)	−10.25	
D (6″ 1/24,000)	− 7.84	
Crown diameter measurements		
C (6″, 1/20,000)	2.2	Mean errors do not differ significantly
D (6″, 1/24,000)	1.8	
A (6″, 1/15,840)[1]	1.7	
E (8¼″, 1/15,840)	1.6	
B (6″, 1/15,840)	1.5	

[1]Under-exposed and over-developed.

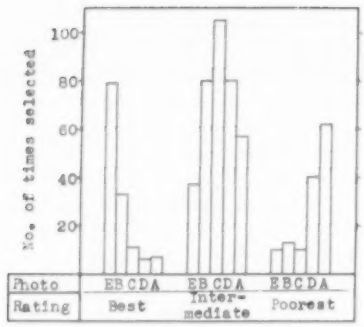


FIG. 1.—Rating of test photography by interpreters.

Discussion

The statements which follow, based on the conditions tested and results obtained, are proposed in the light of certain assumptions: (1) tonal qualities of the normally exposed and developed photography were essentially equal, (2) a representative sample of forest photo image characteristics was provided for the test, and (3) the relative ability to perceive and measure vertical and horizontal dimensions of photo images is an important gage of photo image quality and the relative interpretability of forest aerial photography.

Under-exposure and over-development of the film negative tended to lower rather than improve photo image quality. Admittedly, the mean and variance of the crown diameter measurement differences and the mean height measurement difference of this photography differed only slightly from those of normal photography of the same scale and focal length. The variance of the height measurement differences, however, was found to have been increased considerably and significantly as a result of the abnormal exposure and development. This difference in photo quality was also discernible to the interpreters who found the abnormally exposed and developed photography very objectionable. This photography will not, therefore, be considered further and all subsequent discussion in this paper will be concerned only with the normally exposed and developed test photography.

As will be noted in Table 4, the mean difference of tree height measurements was found to decrease progressively and significantly as the photo scale was reduced. This is felt to be due to the fact that, at larger scales, the interpreter generally is able to pick out and measure *individual* trees in the plot. Since he is unable to completely resolve the tip of the tree due to loss of detail, a very definite negative error could result. As the scale becomes smaller, however, the visual size of the plot lessens, the tree images blend and, although he gets the impression of individual trees, the interpreter probably actually measures the average height of *groups* of trees rather than that of individuals. It is suggested that, as these details coalesce, there is proportionally less tip image loss than occurs in individual trees at larger scale, and that the interpreter essentially measures or estimates a plane rather than a single vertical projection.

This does not necessarily mean that the accuracy of parallax height measurements improves as photo scale decreases. As Table 3 indicates, the reliability of these readings decreases as the scale is reduced in view of the greater variance of the errors with decreased photo scale. In order to obtain parallax height measurements of the same reliability, therefore, considerably more measurements would have to be taken on the small scale photography than on the large. The existence of such a relationship is felt to have a direct bearing upon the relative ability of the average interpreter to perceive photo image detail. In short, and generally speaking, photography producing measurement differences with a small mean and a large variance are considered to be inferior to photography producing measurement differences with a larger mean but a significantly smaller variance.

Conclusions

On the basis of the results obtained from the conditions tested, it is concluded that:

1. Radial distortion of photo images is not a limiting factor in the use of a 6 inch distortion-free lens in forestry photography in Minnesota where scales of 1/15,840 and smaller are employed.

2. Panchromatic photography flown at a scale of 1/15,840 with a distortion-free 6 inch lens can be expected to produce better overall stereoscopic image detail than is obtainable with a conventional 8.25 inch lens at the same scale.

3. Reduction in scale of 6 inch distortion-free lens forestry photography from 1/15,840 to 1/24,000 significantly reduces the reliability of measurements and/or estimates of stereo photo image dimensions.

4. The photo image detail of the 1/15,840 scale normally exposed and developed 6 inch photography was deemed superior to that of all other types of photography tested.

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Helicopter Use on Fire Suppression in the Pacific Northwest

Horace G. Cooper
and Monte K. Pierce

THE Pacific Northwest Region of U. S. Forest Service has recognized for some time the potential use of helicopters in forest fire-control work. Some use has been made of the helicopter over a period of several years; however, this was limited because of the lack of suitable machines for higher altitude work. More recent models have both increased altitude performance and greater load-carrying capabilities. It has now become economical and efficient to use the helicopter in fire-control situations in the rugged terrain of the Pacific Northwest Region.

Twelve helicopters were used on fire-control activities during the 1958 season. The use of these machines aided in the control of 63 fires on seven national forests and resulted in an estimated saving of $300,000 in resources and suppression costs.

Two helicopters were placed under contract in 1958 for a 60-day period from the middle of July to the middle of September. Their operating bases were the Okanogan and Siskiyou Aerial Projects, which would permit their use primarily in the Northern Cascade and southwestern Oregon areas. Ten other helicopters were placed under blanket-rental arrangement for use during emergencies, if available. They were the 2- and 3-place-type Hiller and Bell models with engines that produce from 178 to 260 horsepower. The useful loads ranged from 290 to 450 pounds. These load ratings were adjusted downward under severe conditions of atmosphere, elevation, and terrain.

During 1958 the Pacific Northwest experienced one of the most severe fire-weather seasons of record. Use of helicopters helped to keep burned acreage from becoming large. In order to make a comparison to show this, we can take the Mt. Baker Forest as an example. On that forest the year 1946 brought severe fire weather similar to 1958. In 1958, there were 15 consecutive days of extremely critical fire-weather as compared with 11 days of such weather in 1946. Approximately the same number of fires were started in both years. Although the weather was more severe in 1958, the area burned on the Mt. Baker was only 28 percent of the area burned in 1946 under similar conditions.

During one critical period, all 12 helicopters were in use on fires. Additional helicopters were needed, but suitable models were not available within the region. A single fire required the services of 4 helicopters at one time.

The types of work performed by the helicopters, arranged in sequence according to the principal uses, were:

1. Transporting supplies to a fire.
2. Transporting men to a fire.
3. Scouting fires.
4. Retrieving equipment from a fire.
5. Retrieving smokejumpers.
6. Patrolling mopup.
7. Shuttling men on fire line.
8. Bringing out injured persons.

The majority of helicopter use was in remote sectors. The foot-travel time from the nearest road to various sectors of this year's fires ranged from ½ hour to 32 hours.

We can illustrate the stellar role of the helicopters by citing their performance on the Found Creek Fire on the Mt. Baker National Forest. This fire reached a size of 350 acres in steep, rough country. The foot-travel time to the fire line from the nearest road was 5 hours, and from the base camp it was from 5 to 8 hours. Four helicopters were in use at one time. They flew 160 hours, making 950 flights carrying 2,000 passengers, 600 pounds of paracargo, and 2,800 pounds of air freight.

In the majority of cases on this summer's fires, the use of helicopters was cheaper than other transportation methods. In addition, savings in costs resulted through increased labor and overhead efficiency. The helicopter supplied several remote camps where foot travel was extremely hazardous because of the steep slopes, rock cliffs and a travel route up a cliff-lined mountain stream.

In another case it was considered unsafe to establish a camp on top of the dry ridge as the weather was severe, and there was a prevalence of crown fires in the afternoon. The helicopter carried two men per trip to the fireline and averaged 6 minutes for the round trip. It would have taken the men 5 hours to climb from the base camp on foot.

An outstanding example of helicopter use was fast and efficient mapping on the Entiat Fire on Wenatchee National Forest. A 1½-hour flight enabled the observer to place accurately on aerial photos the 33 miles of fire perimeter. It was estimated that the use of the resulting accurate map increased efficiency by 25 percent.

Additional savings could have been realized through the use of helicopters during the early stages of the Leland Lake Fire, Wenatchee National Forest; however, no suitable helicopter was available for the first 48 hours. To reach this

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fire, at an elevation of about 7,000 feet, required 14 hours of foot travel. After its arrival, the helicopter did an economical and efficient job, moving supplies and personnel.

It is estimated that a savings of over $30,000 were made in transportation costs alone which constitutes a part of the $300,000 savings previously mentioned.

The forests using helicopters were unanimous in their decision that all the flights were justified, with one exception. The exception was the transportation of equipment and supplies on a group of lightning fires south of White Pass on the Gifford Pinchot.

In this instance, the helicopter was available, so it was used to move men and equipment to the fires and back to the highway. It was thought at first that it might have been cheaper to have used packhorses. A thorough analysis of this theory showed that the helicopter use saved a few cash dollars, without considering the increased personnel efficiency and the probable reduction in area burned. Thus, helicopter use resulted in a saving.

Good dispatching and management of helicopter use are of primary importance. The persons who used helicopters were of the opinion that a combination of factors—such as the time element, cost, type of terrain, and availability of other suitable equipment—should be the criteria used in determining where and when to use helicopters.

Cost, as compared with other methods, must be analyzed together with the benefit to be derived from the flight. The helicopter should be released when the emergency is over or when time is not an urgent factor. The benefit ratio seems more favorable in remote areas.

Summary

A review of the 1958 fire season has revealed that helicopters are a valuable tool for fire-control work. If properly used, they are, in the majority of cases, more economical and efficient than other methods of transportation. Other important advantages gained were the savings in time and energy. Getting the men and supplies on a fire quickly while it is small results in savings in resources and suppression costs and makes manpower available sooner for other fires. It allows men to arrive on a fire in better physical condition, increases safety, and permits the expending of energy for a more useful purpose—firefighting rather than hiking. The effectiveness and efficiency of helicopter use can be increased through training and experience. We can predict that an increased and more diversified use is certain in the future.

Coming Events

Intermountain Section

The Intermountain Section will hold its summer meeting September 5-6 with meeting headquarters at the USFS Ranger Station, Panguitch, Utah. Field trips will start 1 PM on the 5th and end at noon the next day, with remainder of time for sight-seeing. Families are especially invited.

Wisconsin-Michigan Section

The Hiawatha Chapter of the Wisconsin-Michigan Section will be host for the summer field meeting of the Section September 11-12, at or near Marquette, Mich. Meeting includes a tour of the Dukes Experimental Forest.

New York Section

The summer meeting of the New York Section will be held September 17-18 at Arnot Forest, near Ithaca. Topic: Management experiments in the area with emphasis on Chemo-forestry as follow-up of winter meeting theme.

Allegheny Section

The Allegheny Section will hold its summer meeting in Atlantic City, N. J., September 17-19.

Northern Rocky Mountain Section

The Northern Rocky Mountain Section will hold a field trip on September 26. No further information available at press time.

Alaska Section

An organizational meeting will be held for the new Alaska Section at Juneau on September 25.

Canadian Institute of Forestry

Annual meeting will be held at Prince George, B. C., October 6-9.

Lake States Forest Tree Improvement Conference

The Fourth Lake States Forest Tree Improvement Conference has been scheduled for October 6 and 7, at the University of Michigan, Ann Arbor.

Central States Section

A joint meeting of the Central States Forest Tree Improvement Committee and Central States Section of the SAF will be held at the Ohio Agricultural Experiment Station, Wooster, on October 8 and 9.

Protecting Forest Products from Insects

L. W. Orr

Timber Resources for America's Future, recently published by the U. S. Forest Service, shows the need for rapid increase in production of timber to keep pace with our fast-growing population. Anything that will make wood in use last longer will help to extend the supply. Much wood is required each year to replace that damaged or destroyed, a use which will undoubtedly increase and may require a considerably larger proportion of forest products than in the past. Ours is a relatively young country but many cities and rural areas now have large numbers of wooden buildings that are sadly in need of repair or replacement because of insect and decay damage.

Much of the wood being used today is less resistant to insects and decay than that cut from old-growth forests during the early history of this country. This fact, together with modern construction practices that often favor termites and decay, will create a rapidly increasing need for structural repairs in future years.

However, unless effective and practical measures for preventing deterioration of wood are developed and are accepted by industry and the American public, substitute materials are likely to be used for more and more of the purposes for which wood has been considered the best.

Major Types of Insect Problems

For the purposes of this discussion there are two major types of insect problems. The first is the protection of rough forest products, including pulpwood, logs, and rough lumber, from damage by ambrosia beetles, bark beetles, and borers. Ambrosia beetles are most destructive to hardwood logs and lumber, particularly in the warmer and more humid portions of the United States and in the tropics, but some species will attack conifers. Infestations in logs that are delayed in reaching the mill are very common and are especially costly in logs intended for making veneer and plywood.

Certain bark beetles and borers infest pulpwood and logs and cause loss not only by their tunneling activities but also by introducing fungi or creating infection courts for staining and decay organisms. Pulpwood and logs that must be stored more than two or three weeks during warm, wet weather are often seriously damaged, especially in the South. For example, recent studies have shown that deterioration in pine pulpwood stored for six months may reduce pulp yield by 10 percent. On the assumption that the yield from the approximately 16 million cords of pine pulpwood used annually in the South is reduced by an average of 2 percent, the yearly loss in wood value is estimated at more than $6,000,000.

The second type of problem is that of protecting finished wood products from damage by various insects, especially termites and powder-post beetles. Of the many species of termites, the drywood and subterranean groups are of most economic importance.

Drywood termites are very destructive in tropical and subtropical areas. In this country, they do considerable damage in southern Florida and southern California. Subterranean termites, however, are far more serious pests in the United States. Many millions of dollars are spent each year in repair and control work and for chemical treatment of soil beneath new buildings. Current design of most residential buildings, with emphasis on slab-on-ground construction, is resulting in millions of new houses that are highly vulnerable to termites. Infestations in such houses will be difficult and expensive to treat because in most cases it will be necessary to drill through the concrete slab to apply chemicals.

In recent years much emphasis has been placed on use of chemicals for treating the soil beneath buildings, especially before slabs are poured. Properly applied, soil poisons are highly effective and have proved to be a valuable supplement to good construction. There has been too much tendency, however, to consider soil treatment as a cure-all, with the result that other precautions such as removal of wood debris, proper drainage, ventilation, clearance between wood and soil, impervious foundations, use of preservative-treated wood, and provision for frequent inspection have been neglected. Furthermore, few builders require application of enough chemical to give more than temporary protection. Many fail to properly treat the soil beneath attached concrete porches, steps, or patios that are usually poured as a separate operation. All indications are for a greatly expanded demand for the services of pest control operators in the near future.

Powder-post beetles of several types damage large quantities of wood in use. Species of the genus Lyctus are perhaps most common, but the Anobiid, Bostrichid, and Ptinid beetles cause much more loss than is generally realized. One of the Cerambycids, *Hylotrupes bajalus* (L.), known as the old house borer or European house borer, is becoming an important pest in the eastern and southern states. It is very prevalent in parts of Europe and in South Africa, where it causes serious structural damage and is considered the most important pest of wood products. Lyctus beetles destroy the sapwood of large-pored hardwoods such as oak, hickory, ash, pecan, walnut, and mahogany. The frequency of

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lyctus infestations is one of the reasons for the current trend toward substitute flooring materials.

Application of Research Information

Enough work has been done on most of these insects so that reasonably effective methods of preventing or controlling infestations can be recommended. The fact that some of these methods are not being generally applied is an indication that they are considered impractical because of cost or inconvenience, or that research findings are not reaching the people who need them. For example, recent tests have shown that freshly cut pine pulpwwod can be dipped in an oil solution of benzene hexachloride and pentachlorophenol and then stored for at least six months with almost no deterioration. Unfortunately, this treatment may be too expensive to be generally accepted unless the price paid for pulpwood increases somewhat. A water emulsion of these chemicals is cheaper but also considerably less effective. Further research is thus needed to find a more practical answer for use where water storage facilities are not available.

The problem of termite damage to buildings will not be solved until the general public as well as loan and insurance agencies are made sufficiently aware of the hazard to demand that manufacturers, architects, and builders use every possible means of preventing such losses.

Lumber and finished products can be protected from lyctus, and perhaps from other types of powder-post beetles, by surface applications of insecticides such as chlordane, lindane, or DDT. However, many mill operators and lumber dealers prefer to take the chance of loss. Some, because of the good markets of recent years, have not had to hold large volumes of lumber in their yards very long and have had little trouble with these insects. They are also discouraged by the necessity for dip treating the rough lumber before it is seasoned and then retreating after it is planed or finished. They know that only a small proportion of their total output is susceptible to attack and are reluctant to treat all their products in order to protect those that may become infested if not treated. Nevertheless, when owners of new homes discover that they have powder-post beetles in their floors or in expensive wall paneling, wood receives a bad name and the use of substitute materials is encouraged.

Examples of Needed Research

Although present methods are reasonably effective in checking infestations and in preventing further loss, entomological research can make substantial contributions, especially by finding cheaper and more positive ways of avoiding the necessity for direct control measures. For example, much can be done by giving more attention to prompt conversion of rough forest products and to special treatment of supplies that must be held in reserve. Better understanding of the seasonal variation in the hazard of insect attack will lessen the need for direct controls.

The susceptibility of wood to powder-post beetles is known to vary with the starch content, at least for lyctus beetles. European and Australian workers have shown that the starch content of trees varies with the season and can be reduced by certain treatments, such as by bark girdling of living trees or gradual seasoning of logs. Other methods of starch depletion should be tried. Perhaps some modification in the air-drying or kiln-drying of lumber would accomplish the same result.

Most of the recent work on termites and other wood-destroying insects has been in tests of chemicals for use as soil poisons or wood preservatives. Little attention has been given to the biologies of the various species or their ecological requirements. Dr. L. R. Cleveland, some 35 years ago, showed that termites depend upon protozoa in their intestinal tracts to digest cellulose. Perhaps there is some way in which this symbiosis can be disturbed and termites indirectly controlled. Powder-post beetles and other wood-feeding insects may have a close association with certain fungi or bacteria. Thus, it is possible that so-called wood-eating insects are actually dependent upon microorganisms for aid in obtaining food from wood. This relationship may exist within the insect, as with termites and protozoa, or within the wood, as with ambrosia beetles and their associated fungi. When more is learned about these interrelationships, we may use a quite different approach in studies of prevention and control.

Because of its many unique qualities, wood is still the most desirable material not only for conversion products like paper and fiberboard but also for such traditional uses as furniture, lumber in buildings, tool handles, pallets, and the like. Improved ways of preventing insect damage to rough and finished wood products will help to insure an adequate supply to meet future needs. An expansion of research on forest products insects is long overdue.

A Time and Accuracy Test of Some Hypsometers

Ellis V. Hunt, Jr.[1]

"PEOPLE RESIST CHANGES," the philosopher has said; and perhaps even we foresters resist, though change surrounds us at all times. There are, of course, good reasons for resisting innovations. Some are impractical; some are not adapted to a wide range of conditions; and some would even give inaccurate results. But some may be desirable.

One field in which new ideas, in the shape of new tools, have been offered to the forester in the last decade is that of tree height measurement. This experiment was designed to test the efficiency of an engineer's hypsometer,[2] the Haga altimeter, and the Spiegelrelaskop (*2*) in comparison with one of our respected older friends, the Abney hand level. The Abney was chosen as the basis of comparison because of its unique position of respect (*3*).

Because experienced personnel are not usually equally proficient with several instruments, and because both speed and accuracy of measurement were to be tested, skilled operators were avoided. Two senior forestry students who had prior limited experience with the Abney were selected for this experiment. A short training session acquainted them with the other instruments. To reduce the labor of the test to a minimum, a relatively open second growth stand of shortleaf and loblolly pine about sixty years old was selected for the site.

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[1]Two senior forestry students, James R. Jordan, forester, U. S. Forest Service, Avery, Idaho, and E. Charles Sebesta, forester, U. S. Forest Service, Danville, Arkansas assisted the author.

[2]The engineer's hypsometer is like the Forest Service hypsometer except that it is only half the size.

Methods

The trees to be measured in the test were selected by casual examination and numbered while walking through the forest. A wooden stake bearing the same number was placed roughly 100 feet from the base of each tree. The measured tree length extended from the ground line to the first live limb on the tree trunk; thus, normal tree measuring conditions were adhered to, but measurement differences due to choice of the operator were avoided.

Tree height angles were carefully measured and checked with a transit set over the stake, and tree heights were computed from these measurements using a table of natural trigonometric functions.

Every tree was measured four times with each of the four hypsometers, both operators using each instrument twice in rotation. Each measurement was timed with a stop watch reading to one-tenth second. The time consumed in measuring the tree was determined as follows:

1. The operator assumed his position over the stake corresponding to the tree to be measured.
2. As he raised the instrument to his eye, the recorder started the watch.
3. The operator called out the instrument reading to the tree base and then to the first live limb.
4. The watch was stopped when the recorder received the latter reading.
5. The two readings and the consumed time were recorded.

Tree heights were obtained by computing the algebraic sum of the instrument readings for each tree. Thus, 1,600 hypsometer measurements were collected from 100 trees.

TABLE 1.—MEASUREMENT TIME IN SECONDS PER TREE FOR TESTS OF 100 TREES

Instrument	Operator	Test	Mean time	Standard error of the mean	Standard deviation
Haga altimeter	A	1	16.8	0.229	2.29
	A	2	18.2	0.251	2.51
	B	1	13.8	0.219	2.19
	B	2	13.6	0.209	2.09
Engineer's hypsometer	A	1	16.7	0.248	2.48
	A	2	16.1	0.320	3.20
	B	1	12.6	0.279	2.79
	B	2	12.9	0.092	0.92
Abney hand level	A	1	33.2	0.731	7.31
	A	2	22.2	0.534	5.34
	B	1	21.9	0.581	5.81
	B	2	21.2	0.522	5.22
Spiegelrelaskop	A	1	53.4	1.371	13.71
	A	2	52.7	1.290	12.90
	B	1	52.1	1.123	11.23
	B	2	51.6	1.391	13.91

TABLE 2.—THE DIFFERENCE IN MEAN TIME IN SECONDS REQUIRED TO MEASURE TREES WITH DIFFERENT HYPSOMETERS[1]

Instruments tested	Difference	Standard error of difference	t[2]
A-1 Abney vs. B-2 Spiegelrelaskop	18.4	1.571	11.7
A-1 Abney vs. B-1 Spiegelrelaskop	18.9	1.340	14.1
B-2 Abney vs. A-1 Engineer's hypsometer	4.5	0.578	7.8
B-2 Abney vs. A-2 Engineer's hypsometer	4.1	0.612	6.7
B-2 Abney vs. A-1 Haga Altimeter	4.7	0.570	8.2
B-2 Abney vs. A-2 Haga altimeter	3.0	0.579	5.2

[1]Note that from Table 1 the slowest set of Abney level measurements was tested against the two fastest sets of Spiegelrelaskop measurements, and that the fastest Abney was tested against the slowest hypsometers and Haga altimeters.

[2]All are significant at the 99 percent confidence level.

All measurements were used in the time tests, but the accuracy tests included only the measurements of trees for which doubly-checked transit measurements were made, 90 trees for one series of tests and 87 trees for the other three series.

Results

From ungrouped data the following items were computed for each set of 100 tree measurements, using methods shown by Nash (*4*):

1. The arithmetic average of measurement time per tree.
2. The standard error of this average.
3. The standard deviation of each set of time measurements.

These items may be seen in Table 1.

Since some of the differences between the average times were fairly large, they were tested for significance. Results of these tests may be seen in Table 2. In this experiment, measurements with the Abney hand level required 24.6 seconds per tree and were significantly faster at the 99 percent confidence level than those with the Spiegelrelaskop at 52.4 seconds per tree. At the same confidence level both the Haga altimeter and the engineer's hypsometer, using 15.6 and 14.6 seconds respectively, were faster than the Abney level. It will be noted that the operators were not kept separate in significance tests. Instead, the compared sets of measurements were selected to obtain the smallest differences. Other tests would have yielded even larger significant differences.

To determine the accuracy of the instruments, the error of each hypsometer measurement was determined by subtracting the transit measurement of the tree to the nearest foot from the hypsometer measurement. This gave positive and negative errors, and the algebraic sum of the errors was divided by the number of trees in each set of measurements to compute the cumulative average error shown in Table 3. The algebraic sign was dropped from the material at this point since only the magnitude of the error per tree measurement was desired, and for each of the 16 sets of measurements the following items were computed by methods taken from Nash (*4*):

1. The arithmetic average of the error per tree in feet.
2. The standard error of this average.
3. The standard deviation of each set of errors.

These measures may be seen in Table 3. Since the smallest mean error was 1.07 ± 0.18 and the largest was only 1.95 ± 0.18 feet, tests for the significance of differences in accuracy were not made.

Conclusions

In this test the Haga altimeter and the engineer's hypsometer were shown to be significantly faster instruments than the Abney hand level, but the Abney was significantly faster than the Spiegelrelaskop. The magnitude of the differences was 9 and 10 seconds and about 28 seconds per tree, respectively. Whether a few seconds saved measuring a tree is of any importance will, no doubt, depend upon the nature of the forester's work. If the work is of such a nature that tree height measurements take a large portion of his time, several seconds saved per tree might be significant. In most job activities, perhaps the difference would be of no practical importance.

All of the instruments tested were found to be accurate enough for all practical purposes except, perhaps, some of the precise measurements needed in some forest research. The average error was smaller than 2 feet per tree and the standard deviation of the errors was about 1.5 feet for each set of 100 measurements. The errors were largely compensating, in no case tested was the average cumulative error larger than 0.76 foot per tree. Perhaps the most important measures of instrument accuracy are the mean error and the standard deviation, because these give one some idea of the probability of occurrence of errors of specific sizes. For instance, 95 percent of the errors should be no farther from the mean error than two times the standard deviation (*4*). Therefore, in most of the tests shown here 95 percent of the individual errors would probably be smaller than 4 feet; thus, for instance, there would be no error in measuring tree heights to the nearest one-half log in timber cruising. Where greater individual tree measurement accuracy is needed, perhaps these instruments would not suffice.

Some operators' comments concerning the operation of the instruments seemed worthy of note.

Haga altimeter (easiest to use of the four instruments): (1) Large enough to handle easily. (2) Exceptionally good sights. (3) Least eye strain in use (4) Needle swing difficult to see when measuring tall trees.

Engineer's hypsometer (the sec-

TABLE 3.—THE ERRORS OF TREE HEIGHT MEASUREMENT IN FEET, (Instrument Measure Minus Transit Measure)

Instrument	Operator	Test	Number of trees	Mean error	Standard error of the mean	Standard deviation	Cumulative average error
Haga altimeter	A	1	90	1.31	0.168	1.59	−0.35
	A	2	87	1.24	0.116	1.08	+0.61
	B	1	87	1.16	0.103	0.96	+0.54
	B	2	87	1.29	0.122	1.14	+0.41
Engineer's hypsometer	A	1	90	1.07	0.180	1.71	−0.09
	A	2	87	1.37	0.131	1.22	−0.15
	B	1	87	1.89	0.190	1.78	−0.02
	B	2	87	1.53	0.172	1.61	−0.17
Abney hand level	A	1	90	1.23	0.180	1.71	+0.17
	A	2	87	1.31	0.146	1.36	−0.34
	B	1	87	1.41	0.163	1.52	−0.53
	B	2	87	1.66	0.199	1.86	−0.34
Spiegelrelaskop	A	1	90	1.69	0.172	1.63	−0.65
	A	2	87	1.64	0.140	1.30	+0.70
	B	1	87	1.95	0.178	1.66	+0.76
	B	2	87	1.72	0.151	1.40	+0.76

ond easiest instrument to use): (1) Distinct color contrast on the scale makes reading easy. (2) The reading can be seen while looking at the tree; therefore, it is a fast instrument to use. (3) The field of vision is limited; thus location of points is difficult and chance for error is large. (4) The instrument is too small to hold easily.

Abney level: (1) Difficulty is encountered in keeping the bubble over the hair line.

Spiegelrelaskop (the most difficult instrument to use): (1) In field conditions the scale is nearly impossible to read due to low light intensities. (2) The instrument has too many scales. (3) The scale does not "settle" fast enough.

Baker and Hunt (*1*) say that the ease and rapidity of scale change on the Haga altimeter make it far superior to many other hypsometers in some types of sample plot work in East Texas Piney Woods because of the great variability of base lengths that may be used without mathematical corrections.

Summary

The Haga altimeter, an engineer's hypsometer, and the Spiegelrelaskop were tested against the Abney level for speed and accuracy of tree height measurement by relatively unskilled personnel in a second growth southern pine forest. Basis of the test was 1,600 measurements of 100 tree heights. The Haga altimeter and the engineer's hypsometer were shown to be about 9 and 10 seconds respectively faster per tree than the Abney, which consumed 24.6 seconds per tree. The Abney, however, was faster than the Spiegelrelaskop at 52.4 seconds per tree. These differences are significant statistically at a confidence level of 99 percent.

For all practical purposes, all instruments tested were found to be accurate enough for ordinary tree height measurements. Maximum expected error per tree was found to be less than 4 feet in most sets of 100 measurements, with a confidence level of 95 percent. Cumulative average error per tree was never more than 0.76 foot in any set of 100 tree height measurements.

Operators' comments indicate that the Haga altimeter was the easiest instrument to use properly.

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Council's Column

Are Subsidies Necessary to Stimulate Private Forestry?

The late Col. W. B. Greeley frequently said "Men conserve things of value." What he meant was that when forestry became economic, landowners would practice it.

The time has come in most of our land when forestry is economic. It is the day long looked forward to by the founders of our profession.

Now that we are practicing forestry on millions of acres, our profession needs to do some soul-searching as to whether forestry on private lands needs the stimulus of subsidies.

If professional foresters believe, as does the writer, that forestry now pays, then public subsidies to landowners for planting, pruning, thinning, protecting or otherwise improving their own forest assets are of questionable justification. It is extremely difficult to reconcile a recommendation by any forester to a landowner that he practice forestry and then offer him taxpayers' money to get him to do it.

The experience of the writer and his colleagues in promoting tree farming during the past 18 years has been mainly in showing landowners their forestry opportunities and helping them take hold on a "do-it-yourself" basis. We have never recommended the practice of forestry where our best judgment indicated that *at the time* it was uneconomic. However, circumstances change. For example, rising values of timber and timber-growing land now make it economic for landowners to plant at their own expense many areas which needed it 15 years ago.

In questioning the necessity of subsidies for inveigling landowners into the practice of forestry, the writer does not object to the fine work of many public and private foresters who have interested landowners in their forestry opportunities. The public farm forestry programs and the private Tree Farm Program have all made significant contributions, as have our many colleagues who render professional service as consultants.

Our profession needs to answer, and soon, the question of whether subsidies are needed to stimulate private forestry. It is a good topic for at least a half day's lively discussion at a future annual meeting.

W. D. HAGENSTEIN

Seasonal Fluctuations in Ponderosa Pine Lumber Prices

T. A. McClay

Both production and consumption of lumber in the western pine region follow a well-defined seasonal pattern, with a rise in the spring and summer and a drop in the fall and winter. This pattern is marked and consistent from year to year (Fig. 1). It is brought about, of course, mostly by the weather conditions that hamper logging activities and building construction during the winter season.

Although it is known that lumber prices do not fluctuate annually as much as lumber production and consumption, there is a belief that the spring pickup in lumber sales activity does produce a seasonal price rise each year. Does this actually occur? Are lumber prices consistently higher in the spring? Is there any seasonal period when prices are appreciably above or below average from year to year? A study was made of reported prices for ponderosa pine lumber, which accounts for about half of total production of all lumber in the western pine region, to find answers to these questions. Price fluctuations were analyzed by observing plotted data and by making statistical and graphic tests.

The author is in the Division of Forest Economics Research, Forest Service, U. S. Department of Agriculture, Washington, D. C. When the article was prepared, he was on the staff of the Pacific Northwest Forest and Range Experiment Station, Forest Service, Portland, Oregon.

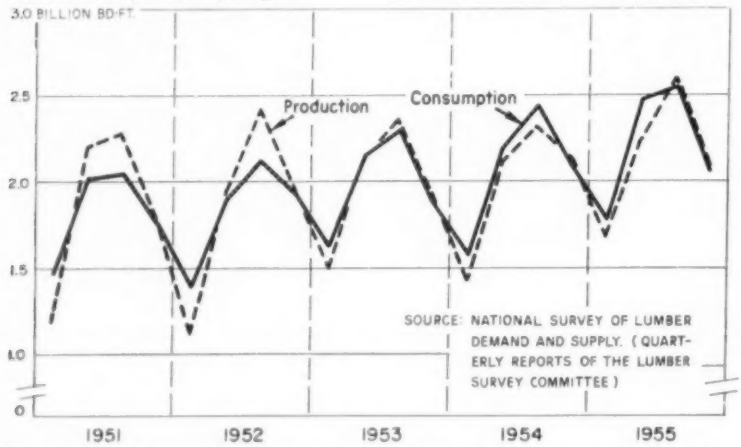

Fig. 1.—Estimated production and consumption of lumber in the western pine region, by quarters, 1951-55.

Monthly index average prices for ponderosa pine lumber for the period 1936 through 1955, as reported by the Western Pine Association, were used in the analysis (Table 1). The Western Pine Association computed these index prices by applying certain lumber grade-yield percentages each month to the f.o.b. mill prices reported to the Association for the various grades. The grade percentages were based on an analysis of wholesale sales, transfers to factories and retail departments, and company use during a given period of 2 or more years. These percentages, or weights, were compiled in 1933 and remained in constant use throughout the 1936-55 period under study.

Table 1.—Monthly Index Average Prices Per Thousand Board-Feet for Ponderosa Pine, 1936-55

Year	Month											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Index price											
1936	20.86	20.73	20.92	20.69	20.66	20.43	20.35	20.42	20.86	21.00	20.97	21.43
1937	22.44	23.88	25.62	26.49	26.37	25.90	26.10	25.60	25.58	25.27	24.20	23.56
1938	23.02	22.97	23.34	22.80	22.29	21.99	21.48	21.03	21.14	20.80	21.00	21.38
1939	22.00	22.73	21.99	21.81	22.08	21.72	21.37	21.62	22.06	23.32	24.16	24.00
1940	23.67	23.63	24.02	24.11	23.57	23.21	22.90	22.59	23.64	25.16	26.48	27.21
1941	27.37	28.11	27.67	27.89	28.23	28.21	28.87	29.81	30.84	31.60	31.86	31.94
1942	32.36	33.01	32.89	32.59	32.88	32.30	32.71	32.73	32.79	32.44	32.77	32.91
1943	33.10	33.24	33.13	33.24	34.00	35.00	35.70	35.77	36.05	36.06	36.71	36.96
1944	36.85	37.15	37.01	36.69	36.67	36.95	37.31	36.01	35.95	36.24	36.37	36.23
1945	36.32	37.17	36.58	36.93	36.77	36.54	36.47	36.65	36.78	36.78	37.34	36.66
1946	36.94	37.00	37.67	39.83	42.17	43.03	43.08	43.39	42.75	42.89	43.24	46.00
1947	48.71	50.04	55.42	56.51	57.91	57.87	58.62	58.94	60.02	63.39	64.71	64.94
1948	68.86	68.30	69.84	68.96	70.83	72.25	74.40	75.61	75.97	75.17	74.28	75.03
1949	72.33	72.91	72.63	71.26	70.82	70.33	69.46	68.00	66.82	66.35	66.69	67.69
1950	67.51	68.32	69.82	70.72	72.92	75.90	79.39	83.01	86.39	88.45	90.21	90.75
1951	91.58	93.66	94.68	95.11	94.36	93.81	93.91	92.49	90.75	90.74	89.36	89.75
1952	90.09	90.57	90.97	91.07	90.64	91.26	91.73	92.16	92.14	91.35	91.45	91.69
1953	91.83	92.29	93.25	93.06	93.56	93.52	93.21	93.25	91.59	89.64	90.21	89.77
1954	88.95	88.41	87.41	87.67	86.99	86.43	86.29	87.19	87.71	87.20	87.06	86.67
1955	87.72	87.80	88.76	90.01	90.95	91.85	91.66	92.17	92.26	91.68	91.53	91.51

Source: Western Pine Association.

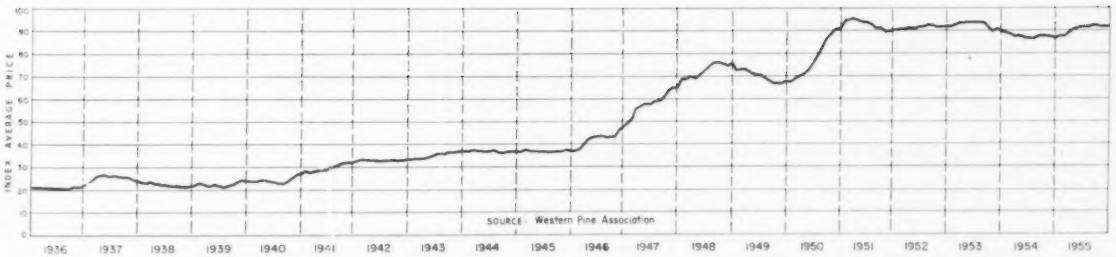

FIG. 2.—Trends of index average prices per thousand board-feet for ponderosa pine lumber, 1936-55.

The weights were as follows:

	Percent
1&2 Clear (B&Btr.) Select	.88
C. Select	4.29
4/4&Thkr. C. & C.&Btr. Select	
D. Select	4.37
4/4&Thkr. D. & D.&Btr. Select	
Aust. Clears, Mldg. & Btr.	
Moulding Stock	.32
Stained Select	.40
Short Select & Pitchy Select	.62
4/4 #1&2 Shop	2.25
4/4 Factory Select (#3 Clear)	.29
5/4&Thkr. Fac. Sel. (#3 Clear)	.13
5/4&Thkr. #1 Shop	1.82
5/4&Thkr. #2 Shop	6.77
5/4&Thkr. #3 Shop	3.90
Stained Shop	
4/4 #1 Common	.15
4/4 #2 Common	8.23
4/4 #3 Common	14.89
4/4 #4 Common	7.01
4/4&Thkr. #5 Common	1.95
Thick Common	11.48
5/4&Thkr. #1, 2, 3&4	
11/16" Common, Timbers	
1-5/8" & 1-9/16" Dimension	
Short Common	.99
4/4&Thkr. Box Lumber,	29.26
Short Shop, Shop Rejects	
	100.00

Observation of Plotted Data Provides Simple Test

There are many commodities, particularly agricultural commodities, that exhibit regular seasonal price patterns. By plotting monthly price data for a period of years, it is sometimes possible to detect seasonal variations if they occur with any consistency. Ponderosa pine lumber prices plotted this way displayed no marked seasonal tendencies during the period 1936-55 (Fig. 2).

A noticeable feature of this time series is the division of price behavior into four 5-year periods. In the prewar years from 1936 through 1940, prices were fairly constant between $20 and $27. During the 1941-45 war period, there was a slow rise to about $37. With the lifting of price controls, prices shot up very rapidly to $91 during the postwar period from 1946 through 1950. The pattern during 1951-55 was somewhat similar to the 1936-40 prewar period, but at a much higher level.

Although plotting monthly price data did not reveal obvious seasonal fluctuations, a more precise test can be made by statistical and graphic procedures.

TABLE 2.—SOURCES OF VARIATION IN PONDEROSA PINE LUMBER PRICES

	5-year periods					20-year period	
Source	Degrees of freedom	1936-40	1941-45	1946-50	1951-55	Degrees of freedom	1936-55
		Mean square					*Mean square*
Total	59					239	
Among years	4	36.28**	115.17**	2,573.42**	51.67**	19	9,473.00**
Within years:							
Linear	1	1.24	18.27**	610.73**	2.15	1	205.00**
Seasonal	10	0.78	0.15	0.60	2.00	10	0.60
Interaction	44	1.14	0.95	17.99	1.92	209	6.84

** Denotes statistical significance to the 1-percent probability level.

Prices Trend Upward: Seasonal Pattern Lacking in Statistical Test

An analysis of variance of ponderosa pine lumber prices provides an objective test of trends and fluctuations over a period of years (Table 2). The results of such a test showed:

1. The variation in price levels "among years" was highly significant for all periods. This means that the average yearly price varied enough during these years to produce real differences.

2. The "linear" price trend within years was highly significant during the 1941-45, 1946-50, and 1936-55 periods, but nonsignificant during the 1936-40 and 1951-55 periods. In other words, monthly prices from January to December exhibited—in this instance—a significant upward trend when averaged for each of two 5-year periods and for the 20-year period; also, it showed a lack of trend from month to month during each of two other 5-year periods. This "linear" effect is due primarily to cyclical and secular trend influences.

3. "Seasonal" effect was nonsignificant for the 20-year period and for each of the 5-year periods. This is a test of the true seasonal effect, since price changes due to linear trends within years has been removed.

The statistical test for seasonal fluctuation in prices does not cover the possibility of a seasonal pattern showing pronounced changes in time of occurrence over the years; it does confirm the premise that a consistent pattern with significant variation did not exist.

Graphic Analysis Shows Irregularity of Seasonal Effect

A series of price data over time may display various movements individually classified as:

1. Secular trend, or a gradual increase or decrease over a long period of time.

2. Cyclical movements, or fluctuations that last longer than 1 year and that occur with some, but not complete, regularity as to duration.

3. Periodic movements, or fluctuations that repeat themselves with

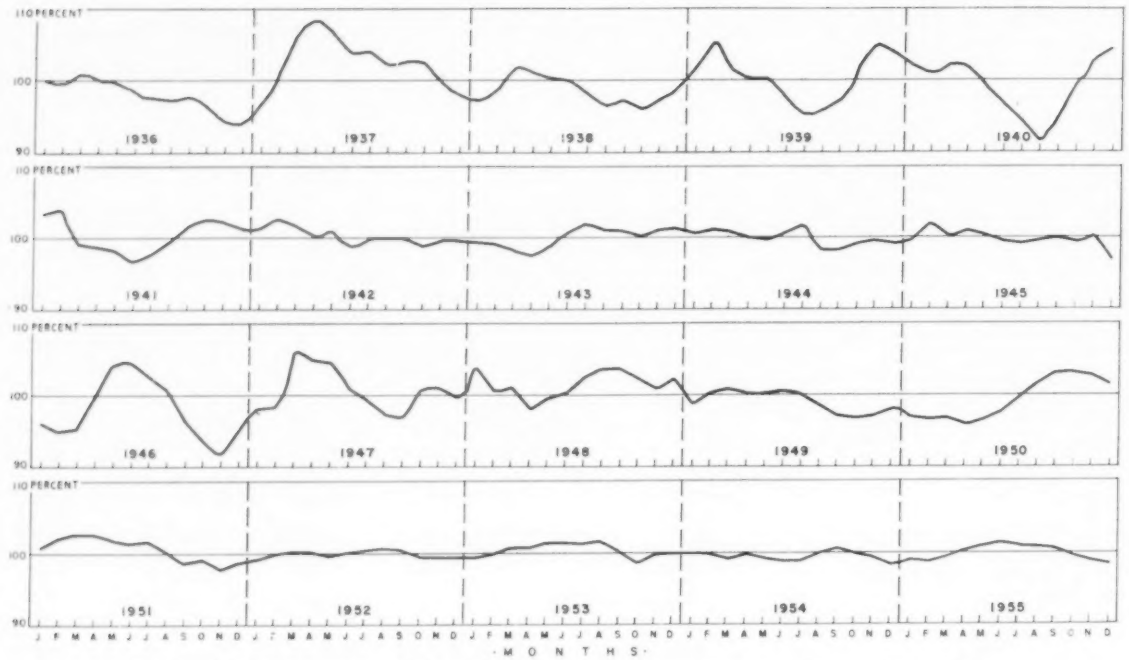

FIG. 3.—Monthly percentages of 12-month moving average of ponderosa pine lumber prices, 1936-55.

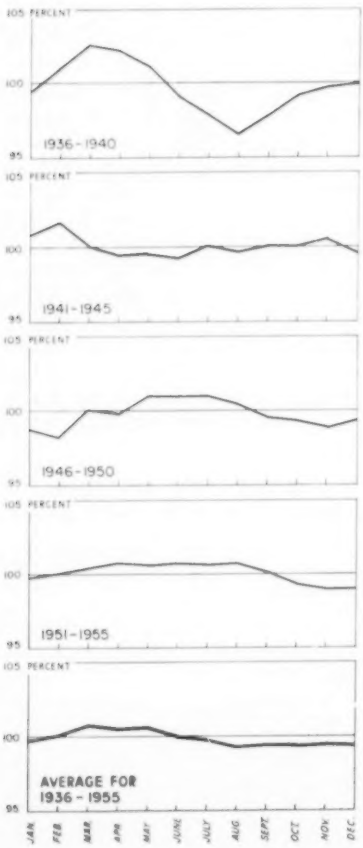

FIG. 4.—Average monthly percentages of 12-month moving average of ponderosa pine lumber prices during selected periods, 1936-55.

rather consistent similarity at regular intervals. Seasonal variation, which has a period of 1 year, is the most common type.

4. Irregular or random variations that consist of those not covered above; they are caused by accidental or chance occurrences such as conflagrations, strikes, or severe storms.

The significance of seasonal variations can be assessed by graphic analysis by removing the effects of secular trend and cyclical movements. This may be done by expressing the monthly prices as percentages of a 12-month moving average centered by a 2-month moving average. If the percentages for any month or season of the year are consistently above or below average over a period of years, it can be said that a seasonal pattern exists. However, the actual difference between an above-average season and a below-average season may be so small that it has no real meaning.

Monthly percentages of a 12-month moving average for each year from 1936 to 1955 show seasonal fluctuations of varying magnitudes but with little year-to-year consistency (Fig. 3).

During the prewar years 1936-40, there was at least a tendency for prices to be above average in the early part of each year and to fall below average in the latter part. However, 1939 and 1940 depart from this pattern in that prices averaged high in the latter part of the year as well. It may be that war effects were already having some influence. Although a tendency for seasonal variations is present in this prewar period, it cannot be considered consistent and thus predictable.

In the war period from 1941 to 1945, the supply-demand relationship coupled with government price control created an obviously abnormal situation. The trend in reported prices over this period was relatively smooth, with season of the year having practically no effect.

Even though prices showed a strong upward trend in the early postwar years from 1946 to 1950, a softening or strengthening within a year might be expected if season had any real significance on price.

However, the above-average months for each year during this 5-year period were June, March, January and August, March, and September, respectively. Each year had a high and low point, but it is evident that there was no regularity of seasonal occurrence from year to year.

During the period from 1951 to 1955, prices remained quite stable at about $90. Monthly deviations were very minor and pattern consistency was almost wholly lacking. A case for seasonal influence on ponderosa pine lumber prices certainly could not be made here.

Over the 20-year period from 1936 through 1955, prices during the spring months were more often above than below average, whereas the opposite was true for the winter months. However, the difference was negligible and amounted to less than 1 percent in each case (Fig. 4). When averages are computed for each of the 5-year periods previously discussed, only the prewar years from 1936 through 1940 show a distinguishable pattern; and even here the greatest deviation is only 2½ percent above average in March and 3½ percent below average in August.

One might surmise that during "normal" years there should be a predictable seasonal price fluctuation. But normal years in the lumber industry are the exception rather than the rule, and who knows whether or not next year will be normal. Furthermore, a "normal" year is not easy to define. The difficulty is that so many factors other than season influence lumber prices that the effect of season is nullified. Cyclical trends in the construction industry undoubtedly exert the greatest influence, and such things as production level, stocks on hand, and general economic conditions also contribute to the fluctuations.

Summary

A graphic and statistical analysis was made of Western Pine Association average index prices for ponderosa pine lumber during a 20-year period from 1936 through 1955. An analysis of variance revealed significant upward trends in prices and a lack of consistent seasonal variation. Graphic tests showed that although certain seasons of the year tended to be associated with above- or below-average prices, there was no consistent and predictable pattern from year to year and the average difference between high and low seasonal prices was negligible.

Price fluctuations are basically created by an imbalance between supply and demand at any particular time. The relationship of these factors is strongly influenced by many things, such as availability of mortgage funds, interest rates, housing legislation, inventory levels, production capacity and output, or the national economic situation. The sporadic behavior of such price-influencing elements during the 20-year period studied resulted in a lack of correlation between season of the year and ponderosa pine lumber prices.

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Forest-Wildlife Session at Next North American Wildlife Conference

One of the special features of the Twenty-Fifth North American Wildlife Conference will be a technical session devoted exclusively to the problems of management of wildlife on forest and range areas. The conference will be held in Dallas, Tex., March 7-9, 1960.

This special session will provide an exceptional opportunity for members of the Society of American Foresters to present their views and research findings to a large audience of wildlife technicians and research biologists. Here is a place where foresters can present their views on the problems of integrating timber and wildlife production on public and private lands.

Papers will be published in the conference transactions which are widely read throughout the world. Time available for presentation at the conference is limited to 20 minutes, but printed papers in the transactions are not limited in length.

William L. Webb of the Department of Forest Zoology, State University College of Forestry, Syracuse 10, N. Y. has been named program chairman for this session. He requests that persons wishing to present a paper at this technical session submit a title and a brief summary of their material as early as possible to assure consideration.

Cone Maturity Affects Germination of Longleaf Pine Seed

B. F. McLemore

THIS paper summarizes information on how the maturity of longleaf pine (*Pinus palustris* Mill.) cones at collecting time affects the germinability of the seed. Cone maturity is evaluated in terms both of calendar date and of specific gravity at time of picking; the latter measure also illustrates the tree-to-tree variation in cone maturity on any one date.

Recent expansion of nursery production and wide acceptance of direct seeding have created unprecedented demands for longleaf seed. Collectors have tended to meet this demand by beginning to pick cones earlier than had been customary—the purpose being to lengthen the harvesting season. The question is often asked if early harvest affects the quality or yield of seed.

With several important American conifers, thoroughly mature cones yield the most highly viable seed, and maturity is usually judged by date of collection or—as in this study—by the specific gravity of the cones (*1, 2, 3, 4*). For the southern pines, Wakeley (*5*) reports that cones are mature enough to open and release their seeds when their specific gravity, measured immediately after picking, has dropped below 0.89. He considers the crop in any one place mature enough for collection when the freshly picked cones from 19 out of 20 randomly selected trees will float in SAE 20 oil, or other oil of the same specific gravity.

Even if unripe cones can be opened, the vigor with which the seed will germinate remains in doubt. The literature just cited indicates that seed from immature cones does not germinate so well as seed from thoroughly ripe ones. Any such reduction in vigor or completeness of germination would be particularly undesirable in direct seeding.

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Procedure

The cones were collected near Alexandria, Louisiana, from large-crowned, open-grown longleaf about 40 years old.

Six cones were taken from each of 27 longleaf pines on each of four dates. The first collection was on September 9, 1957, when some cones were just beginning to float in water—that is, when their specific gravity was about 1.00. The second collection was made 15 days later, on September 24. The third was on October 7, which in 1957 was at the height of the commercial cone-harvesting season; on this date the specific gravity of cones from most trees was less than 0.89. The fourth and last collection was made just as the cones were beginiing to open on the trees, but before they had released seeds. The dates of the last collection varied with individual trees and ranged from October 14 to November 1.

On each of the 3 earlier dates, the specific gravity of the 6 cones collected from any one tree was estimated by selecting 3 of the 6 at random and determining and averaging their specific gravities. Specific-gravity determinations were made in the field, a few minutes after the cones were picked. After the third collection, the 3 successive specific-gravity estimates for each tree were averaged to determine that tree's representative specific gravity for the period September 9 through October 7. In the light of these representative specific gravities, the 27 trees were assigned to 3 groups of 9 trees each, designated as high, medium, and low specific-gravity classes. Within each class, 3 trees were assigned at random to each of 3 within-class replications, the identities of which were maintained throughout the study. These replications within classes furnished the basis for statistical evaluation of results.

Throughout drying, extraction, and cleaning, lots of cones and seed were kept separate by trees and by dates of collection. When seed from 3 lots was combined into a specific-gravity and date-of-collection replication, all 3 trees constituting the replication were represented by equal numbers of seeds.

The cones were spread on the floor of an office building and dried at room temperature with electric fans. Most cones from the first two collections failed to open normally. A knife was used to lift the scales of cones that had not started to open during the first 8 or 10 days. Those that did not respond to this persuasion were torn open, to permit recovery of all seeds.

Seeds were dewinged by hand and cleaned with an aspirator to at least 99 percent sound seed. They were then stored at 34° F. (and moisture content of approximately 10 percent) from December 11 until germination tests were begun on January 6, 1958. Germination tests lasted for 28 days, but very few seeds germinated after 15 days. The tests were conducted in a modern seed laboratory where light and temperature are carefully controlled. The germinating medium was a 1:1 mixture of sand and vermiculite in covered glass dishes. In all, 3,600 seeds were used in the tests.

Results

Germination of seed collected September 9 averaged 46 percent, as contrasted to 66 percent for seed from cones gathered on September 24 and 88 percent for October 7 collections. The best average germination, 94 percent, was from seed from fully ripened cones.

The observed germination percents were transformed to the usual

arcsin $\sqrt{\text{percent}}$ equivalents for analysis of variance, which showed that the average germination percents for collection dates and for cone specific-gravity classes (Table 1) differed at the 1-percent level of significance.

Differences in average germination by specific-gravity classes were highly significant, mainly because of the increase in germination from the high specific-gravity class to the low for the first three dates of collection. For the first collection, germination was 25 percent for seed from cones in the high specific-gravity class and 57 percent for seed from cones of low specific gravity. The same trend appeared in the second and third collections. By contrast, specific-gravity class had no influence on germinability of seed from the last collection; as shown by the analysis of variance, however, the contrast was not strong enough to constitute a significant interaction. The fact that there was very little difference in germination of seed from the three specific-gravity classes of cones for the last collection indicates that all seed lots extracted from fully ripe cones (i.e., picked just as they were opening on the trees) germinated equally well.

Table 2 lists, by individual trees and dates of collection, the average specific gravities of cones from the 27 trees. There was very little variation in the specific gravities of cones from any one tree on any particular date. In the first collection, on September 9, no tree had fully mature cones; average specific gravities ranged from 0.93 to 1.05. On September 24, cones from 5 trees had specific gravities of 0.88 or less, while the range for all trees was 0.85 to 1.04. By October 7, cones from 25 trees had specific gravities of 0.88 or less, so that Wakeley's criterion for the beginning of cone collection was being closely approached. By October 14, however, cones on 6 of the 27 trees were beginning to open. Therefore, if the beginning date for commercial collection had been delayed until October 7, the trees having the earliest date of cone maturity would have started to shed some seed a week after collection commenced.

TABLE 1.—GERMINATION OF FRESH LONGLEAF PINE SEED BY DATE OF COLLECTION AND SPECIFIC-GRAVITY CLASS OF CONES

Specific-gravity class	September 9		September 24		October 7		Oct. 14-Nov. 1	Average
	Germination	Specific gravity	Germination	Specific gravity	Germination	Specific gravity	germination	germination
	Percent		*Percent*		*Percent*		*Percent*	*Percent*
High	25	1.01	48	0.96	82	0.88	95	62
Medium	55	.97	75	.92	90	.83	93	78
Low	57	.96	75	.88	92	.77	94	80
Average	46	0.98	66	0.92	88	0.83	94	74

TABLE 2.—AVERAGE SPECIFIC GRAVITIES OF LONGLEAF CONES BY TREE NUMBER AND DATE OF COLLECTION

Tree number	Specific gravity on—		
	September 9	September 24	October 7
1	0.99	0.94	0.86
2	.96	.89	.84
3	1.01	.98	.90
4	.96	.94	.84
5	.96	.90	.78
6	1.00	.97	.86
7	1.02	.95	.88
8	.99	.93	.83
9	1.00	.91	.75
10	.99	.94	.79
11	.98	.90	.79
12	.93	.91	.84
13	.99	.92	.83
14	.96	.86	.75
15	1.01	.92	.86
16	.96	.87	.75
17	.95	.93	.85
18	1.03	.98	.88
19	1.02	.96	.81
20	.97	.89	.78
21	1.02	.94	.85
22	1.05	1.04	.98
23	1.00	.93	.84
24	.97	.88	.81
25	.95	.90	.77
26	.94	.85	.76
27	.95	.86	.77
Average	.98	.92	.82
Range	.93-1.05	.85-1.04	.75-.98

Discussion

These results point up the dilemma faced by nurserymen, seed dealers, direct seeders, and others interested in obtaining large amounts of longleaf seed. If cone collection starts too early, the seed will not germinate well. But if collection is delayed until all cones are ripe, or until those from 19 out of 20 trees have specific gravities of 0.88 or less, many cones will begin to shed their seed before the collectors get to them. Probably this circumstance is not peculiar to longleaf. The Southeastern Forest Experiment Station (unpublished data) has indicated a similar situation in loblolly pine in one locality, and it may occur in other southern pines.

Because indiscriminate early harvesting cannot be recommended, the only safe way to lengthen the collecting season is to confine early efforts to trees on which the cones have specific gravities of 0.88 or less. With the 27 trees in this study, for example, collection could have begun on September 24, when 5 trees had ripe cones, and could have continued at least to November 1, when 4 trees still had not released their seed.

Checking the cones on individual trees and making several collections in the same stand may be impractical where cones are bought in large quantities from private collectors. However, the method might be worthwhile in a seed

orchard or a stand with seed of exceptional desirability or abundance. The fact that the cones on any one tree tend to ripen simultaneously would lessen the amount of checking that would be necessary.

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Methoxone Treatment of Longleaf Pine Seed

Despite a great deal of research, the establishment of plantations of longleaf pine (*Pinus palustris* Mill.) is difficult and requires intensive nursery and planting practices. One major drawback to extensive use of this species is the "grass" stage, which commonly lasts from three to five years but may be much longer. Fransson,[1] working with Scots pine (*P. sylvestris* L.), reported that seedlings from seed treated with Methoxone (2-methyl-4 - chlorophenoxy - acetic acid) became dormant three weeks later than controls, and shoots grew 12 centimeters during this period. These responses suggested that the "grass" stage of longleaf pine might be shortened by treating the seed with Methoxone.

In 1953 an exploratory study was started at the Lake City, Florida, Research Center of the U. S. Forest Service in an attempt to shorten the "grass" stage of longleaf pine by chemical treatment of the seed.[2] The treatments did not induce early initiation of height growth, but did affect seed germination and early seedling development.

Longleaf pine seeds were soaked at room temperature for 24 hours in aqueous solutions of 12 concentrations of Methoxone and then rinsed in running water. Each treatment was applied to 30 seeds. Ten seeds of each treatment were sown in each of three randomized blocks. The seeds were sown at 6-inch intervals to minimize competition. Seedbeds were tilled but not fertilized. Germination counts were made for five weeks, and abnormal seedling development was recorded.

Any effect of the Methoxone treatments on height growth should have been apparent after one or, at the most, two dormant periods. Therefore, the seedlings were not transplanted but left at their initial spacing in the seedbeds. Three years after sowing, none of the seedlings had passed the "grass" stage.

Germination was reduced by Methoxone concentrations greater than 500 ppm., with the differences significant at the 1 percent level of probability, but concentrations of less than 500 ppm. had no detectable effect on germination (Table 1). Differences in germination were tested by analysis of variance and multiple range tests.

Another early effect noted was that concentrations of 500 ppm. to 5,000 ppm. resulted in extreme elongation of the cotyledons, with a loss in stiffness. Cotyledons on seedlings produced from seed treated at 1,000 ppm. were so flaccid as to be unable to support the empty seed coat. The 5,000 ppm. concentrations caused the cotyledons to lie almost flat on the ground.

The results showed that high concentrations of Methoxone were toxic to longleaf pine seed, and the effect of low concentrations was either too short-lived or did not stimulate the proper physiological response for shortening the length of time longleaf stayed "in the grass."

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[1]Fransson, P. Stronger pine plants from 'hormone'-treated seed. (Abstract.) Forestry Abstracts 13:3763. 1952.

[2]The study was designed by François Mergen, now assistant professor of forest genetics, Yale University.

TABLE 1.—NUMBER OF SEEDS GERMINATED AFTER TREATMENT WITH METHOXONE[1]

Block number	Concentration of Methoxone solution											
	0 ppm.	10 ppm.	20 ppm.	50 ppm.	100 ppm.	250 ppm.	500 ppm.	750 ppm.	1,000 ppm.	5,000 ppm.	1%	2%
	Number of seed											
I	6	10	9	9	8	10	9	7	4	1	1	1
II	10	8	9	8	10	8	6	7	4	6	0	0
III	4	7	9	7	9	8	5	5	7	2	0	0
Total	20	25	27	24	27	26	20	19	15	9	1	1

[1]Ten seeds per block per treatment.

A Classified Directory of Workers in the Economics of Forestry in the United States and Canada

Compiled by a committee of the Division of Forest Economics and Policy of the Society of American Foresters[1]

The fields of specialization of those listed in the directory are indicated by the following code in the order of individual interest:

1. Economics of forest management for multiple products.
2. Economics of forest management for timber.
3. Economics of forest management for other products.
4. Economics of harvesting forest products.
5. Economics of processing forest products.
6. Forest resource analysis.
7. Forest industry analysis.
8. Forest valuation, credit, and insurance.
9. Forest land economics.
10. Economics of forestry policies and programs.
11. Foreign forestry economics.
12. Taxation of forestry.
13. Marketing and trade in forest products.
14. Demand and prices of forest products.
15. Economic statistics and methodology.
16. Economic theory.

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Troxell, Harry E., Jr. 624 Armstrong Ave., Ft. Collins, Colo. Colo. State Univ., assoc. professor; teaching, research. b. 1921; MF, 1947, Duke Univ. Fields 2, 13, 14. Member For. Prod. Res. Soc., Soc. of Am. For.

Tubbs, Carl H. Lake States Forest Exp. Station, St. Paul, Minn. U. S. Forest Service, research forester; research. b. 1932; MS, 1957, Mich. State Univ. Fields 13, 4, 1. Member Soc. of Am. For.

Vaux, Henry J. 243 Mulford Hall, Univ. Cal., Berkeley 4, Cal. Univ. Cal., School Forestry, dean, professor; administrative, teaching, research. b. 1912; PhD, 1948, Univ. Cal. Fields 1, 9, 10. Member Soc. of Am. For.

Voigt, Alvi Osmond. 5 Weaver Hall, Pa. State Univ., Univ. Park, Pa. Pa. State Agr. Extension, asst. professor; extension, editorial, research. b. 1928; MS, 1957, Pa. State Univ. Fields 13, 16, 10. Member Am. Farm Ec. Assn., Am. Mktg. Assn.

Wackerman, A. E. Box 4744, Duke Station, Durham, N. C. Duke Univ., professor; teaching, research, business, administrative. b. 1897; MF, 1922, Yale Univ. Fields 4, 5, 12. Member Soc. of Am. For.

Walker, Nat. Forestry Dept., Okla. State Univ., Stillwater, Okla. Okla. State Univ., assoc. professor; teaching, research. b. 1909; MS, 1955, Pa. State Univ. Fields 8, 6, 1. Member Soc. of Am. For.

Wallace, Oliver P. 9 Valentine Hill Rd., Durham, N. H. Univ. N. H., assoc. professor; teaching, research. b. 1914; PhD, 1953, Univ. Mich. Fields 7, 13, 9. Member Soc. of Am. For.

Wantrup, S. V. Univ. Cal., Berkeley 4, Cal. Univ. Cal., professor; research, teaching. b. 1906; PhD, 1932, Univ. of Bonn. Fields 16, 10, 13. Member Am. Ec. Assn., Am. Farm Ec. Assn., Western Farm Ec. Assn.

Warner, John Robinson. 2192 Haddington Rd., St. Paul 13, Minn. U. S. Forest Service, Lake States Forest Exp. Station, forest economist; research. b. 1922; DF, 1952, Duke Univ. Fields 13, 14, 15. Member Soc. of Am. For.

Warren, Peter Beach. Hamilton, O. The Champion Paper and Fibre Co., economist; research. b. 1922; BA, 1948, Princeton Univ. Fields 10, 15, 16. Member Am. Ec. Assn., Southern Ec. Assn.

Webster, Henry H. Northeastern Forest Exp. Station, 102 Motors Ave., Upper Darby, Pa. U. S. Forest Service, forest economist; research, government service. b. 1930; MF, 1956, Univ. Mich. Fields 6, 2, 16. Member Am. Ec. Assn., Am. Farm Ec. Assn., Soc. of Am. For.

Wellwood, Robert W. Univ. B. C., Vancouver 8, B. C., Can. Univ. B. C., professor; teaching, research, administrative, business, editorial, government service. b. 1912; PhD, 1943, Duke Univ. Fields 5, 14, 13. Member Can. Inst. of For., For. Prod. Res. Soc.

Wheeler, Philip Ridgly. 2026 St. Charles Ave., New Orleans 13, La. Southern Forest Exp. Station, chief div. forest econ. research; government service, administrative, research, editorial. b. 1907; MF, 1930, Univ. Mich. Fields 6, 1, 13. Member Soc. of Am. For.

White, Zebulon W. 205 Prospect St., New Haven 11, Conn. Yale Univ., School Forestry, professor; teaching, business. b. 1915; MF, 1938, Yale Univ. Fields 2, 7, 8. Member Soc. of Am. For.

Wikstrom, John H. 3809 Jackson St., Ogden, Utah. Intermountain Forest and Range Exp. Station, research forester; research, government service. b. 1920; MF, 1942, Ore. State College. Fields 9, 10, 6. Member Soc. of Am. For.

Williams, Ellis T. 4208 46th St., Wash. 16, D. C. U. S. Forest Service, forest economist; government service, research. b. 1908; MBA, 1932, Harvard Univ. Fields 13, 8. Member Am. Ec. Assn., Soc. of Am. For.

Wilson, Alvin Kay. 3707 Brinker St., Ogden, Utah. Intermountain Forest and Range Exp. Station, research forester; government service, research. b. 1915; MF, 1949, Pa. State Univ. Fields 6, 2, 7. Member Soc. of Am. For.

Wilson, David A. Canadian International Paper Co., Sun Life Bldg., Montreal, P. Q., Can. Canadian International Paper Co., economist; business. b. 1923; PhD, 1955, Univ. Cal. Fields 5, 14, 10. Member Am. Ec. Assn., Can. Inst. of For., Econometric Soc., For. Prod. Res. Soc.

Wilson, Richard Clayton. 4849 27th Rd. S., Arlington 6, Va. U. S. Forest Service, Div. Forest Econ. Research, chief forest survey branch; government service. b. 1910; BSF, 1934, Univ. Cal. Fields 6, 9, 7. Member Soc. of Am. For.

Winer, Herbert I. 205 Prospect St., New Haven 11, Conn. Yale Univ., School Forestry, asst. professor; teaching, research, administrative. b. 1921; PhD, 1956, Yale Univ. Fields 4, 5, 10. Member For. Prod. Res. Soc., Soc. of Am. For.

Winters, Robert Kirby. 5400 Moorland Lane, Bethesda 14, Md. U. S. Forest Service, forest economist; research, government service; b. 1902; PhD, 1935, Univ. Mich. Fields 13, 14, 11. Member Soc. of Am. For.

Wohletz, Ernest W. Univ. Idaho, College Forestry, Moscow. Univ. Idaho, dean college forestry, director forest wildlife and range exp. station; administrative, teaching, research. b. 1907; MS, 1947, Univ. Cal. Fields 10, 9. Member Soc. of Am. For.

Woodbury, Raymond Joseph. 6 Strafford Ave., Durham, N. H. Univ. N. H., graduate asst.; research, government service. b. 1936; BS, 1958, Univ. N. H. Fields 4, 2, 13.

Woodfin, Richard O., Jr. 414 E. Nevada St., Rapid City, S. D. U. S. Forest Service, Rocky Mt. Forest and Range Exp. Station, technologist; research. b. 1933; For. Util., 1955, Colo. State Univ. Fields 1, 6, 7. Member For. Prod. Res. Soc.

Worley, David P. 39 Jackson St., Berea, Ky. U. S. Forest Service, research forest economist; research. b. 1921; MF, 1947, Duke Univ. Fields 1, 9, 13. Member Soc. of Am. For.

Worrell, Albert Cadwallader. 360 Prospect St., New Haven 11, Conn. Yale Univ., School Forestry, assoc. professor; teaching, research. b. 1913; PhD, 1953, Univ. Mich. Fields 10, 16, 1. Member Am. Ec. Assn., Soc. of Am. For.

Yoho, James Gibson. Duke Univ., School Forestry, Durham, N. C. Duke Univ., assoc. professor; teaching, research. b. 1920; PhD, 1956, Mich. State Univ. Fields 16, 15, 2. Member Am. Ec. Assn., Am. Farm Ec. Assn., Soc. of Am. For.

Young, Charles E. Tacoma Bldg., Tacoma 1, Wash. Weyerhaeuser Timber Co., economist; business, research. b. 1914; MBA, 1939, Northwestern Univ. Fields 1, 14, 6.

Zaremba, Joseph. 205 Comstock Ave., Syracuse 10, N. Y. State Univ. N. Y., asst. professor; teaching, research. b. 1923; PhD, 1958, Harvard Univ. Fields 15, 16, 14.

Zivnuska, John A. 243 Mulford Hall, Berkeley 4, Cal. Univ. Cal., School Forestry, assoc. professor; teaching, research. b. 1916; PhD, 1947, Univ. Minn. Fields 7, 10, 11. Member Soc. of Am. For.

Zumwalt, Eugene Vernon. Box 1508, Juneau, Alaska. Bur. Land Mgmt., area forester and range officer; government service. b. 1912; PhD, 1951, Yale Univ. Fields 1, 10, 13. Member Soc. of Am. For.

Fields of Specialization or Interest

Workers who indicated the field as their second and third choice are marked "2" or "3."

1. *Economics of forest management for multiple products*

Adams (3)
Alderman
Bauknight
Beazley (3)
Best (3)
Boykin (3)
Brandes
Brock
Christopher (3)
Clawson
Conway
Cotner
Dana (2)
Davidson
Eisenmenger
Flory
Fulcher
Gregory (3)
Guttenberg
Hamilton
Hayes
Hedlund (2)
Hopkins, D. R.
Huckenpahler (3)
Huey
Hutchison, O. K.
Kelso
Knox
Kollmeyer (2)
Kukachka (3)
Lammi (3)
Larson
Lasko
Lloyd
Loomer
McCorkle (2)
McGregor (3)
McKenzie
McMahon (2)
Marquis (3)
Martin
Marty (2)
Mayer
Miller (2)
Moore, R. R. (2)
Myhre (2)
Page
Parker
Pfeiffer (2)
Pleasonton (3)
Redman (2)
Reynolds
Smith, S. C.
Somberg
Stoddard
Stoltenberg
Teeguarden
Tubbs (3)
Vaux
Walker (3)
Wheeler (2)
Woodfin
Worley
Worrell (3)
Young
Zumwalt

2. *Economics of forest management for timber*

Alderman (2)
Amidon
Baird
Bamping
Bell
Besley
Bjorklund
Black
Bond
Bryant
Chapelle
Cheston (2)
Christen
Christensen (3)
Christiansen
Craig, G. A.
Davis
Dickerman (3)
Dinneen
Duerr
Essex
Fedkiw
Fellows (2)
Findell
Fox (3)
Fry
Gaffney
Grah
Guernsey
Hagenstein, P. R.
Hagenstein, W. D.
Harkin
Herrick
Herrington
Hetrick
Hopkins, F. S.
Horne
Horning
Huey (2)
Jeffers
Jones
Keniston
King, D. A.
Kirkwood
Knox (2)
Kolbe (3)
Little
Love
Lundgren
McClay
Marty
Mead (3)
Mesavage
Metcalf (2)
Meteer
Meyer, W.H.
Mignery
Moak
Moore, H. R. (2)
Moore, R. R. (2)
Natti
Nelson
Newport
Patterson
Randall, A. G.
Randall, W. R.
Row
Rowbury
Sanders (2)
Schallau (2)
Shideler
Siegel
Smith, J. H. G.
Smith, R. C. (2)
Somers
Southern (2)
Stout (3)
Swager (2)
Swain
Todd
Townsley (2)
Troxell
Webster (2)
White
Wilson, A. K. (2)
Woodbury (2)
Yoho (3)

3. *Economics of forest management for other products*

Alderman (3)
Camp
Christiansen (2)
Cotner (2)
Coutu
Fulcher (2)
Hetrick (2)
Hogarth
Horne (2)
Horning(2)
Jeffers (3)
Little (2)
Lloyd (2)
Loomer (2)
Lund
McCorkle
McMurtry
Malaher
Martin (3)
Moore (3)
Parker, P. J. (3)
Rader
Randall, W. R. (2)
Smith, S. C. (2)
Somers (3)
Timmons

4. *Economics of harvesting forest products*

Amidon (2)
Beggs
Chapelle (2)
Christiansen (3)
Dane (2)
Dickerman (2)
Dinneen (2)
Fedkiw (2)
Fry (2)
Gates (3)
Gockerell (3)
Grah (2)
Guernsey (2)
Guttenberg (2)
Henley (3)
Herrick, A. M. (3)
Herrick, D. E. (2)
Horne (3)
Horning (3)
Huey (3)
Keniston (3)
Kirkwood (2)
Kolbe (2)
Lundgren (2)
Lupsha
McCauley (3)
McCullough
MacFarlane (3)
Marble (2)
Moore, H. R.
Moore, R. R. (3)
Noblet (3)
Perry
Row (2)
Seale (3)
Siegel (2)
Somers (2)
Stokes (3)
Stout
Sullivan
Taylor
Townsley
Trenk (3)
Tubbs (2)
Wackerman
Winer
Woodbury

5. *Economics of processing forest products*

Anderson
Baird (3)
Bartlett (3)
Bauknight (2)
Beggs (2)
Bethel
Booth (3)
Brandes (3)
Bruce (3)
Chapelle (3)
Dowdell
Eisenmenger (2)
Erb (3)
Fellows
Frazier (2)
Furlow (2)
Gates (2)
Guernsey (3)
Harrell
Herrick, D. E. (3)
Holmes (2)
James, G. W. (2)
Jones (2)
Kramer
Kukachka (2)
Lupsha (2)
MacFarlane (2)
McKellar (3)
McLeod
Mahood
Meyer, V. W. (3)
Miller
Newport (3)
Ostrander (2)
Peck (3)
Perry (2)
Pratt
Riley
Row (3)
Saucier
Stevenson
Todd (3)
Wackerman (2)
Wellwood
Wilson, D. A
Winer (2)

6. *Forest resource analysis*

Armstrong (2)
Babcock (2)
Beasley
Best
Burks
Callahan
Camp (2)
Carothers (2)
Chase
Clawson (3)
Corty
Crafts (2)
Craig, R. B. (3)
Dickerman
Dowdell (3)
Duerr (2)
Findell (2)
Frazier (3)
Gedney
Gregory
Hair (3)
Hedlund
Herrington (2)
Horn (3)
Howard (3)
Huckenpahler (2)
Hutchison, O. K.(3)
Hutchison, S. B.(3)
Ibberson
James, L. M.
King, D. B. (3)
Kolimeyer
Lachance
Little (3)
Love (3)
Lowry (2)
Lupsha (3)
McClay (3)
McGuire
McMahon (3)
Mayer (2)
Mendel (2)
Merrick (2)
Metcalf
Moravets
Morgan, J. T. (2)
Mueller (2)
Myhre
Natti (2)
Nelson (2)
Noblet
Ogden
Peck (2)
Pfeiffer
Pikl (3)
Pringle (2)
Quinney (3)
Rettie (2)
Roberts
Samson
Sanders (3)
Schrey
Somberg (3)
Stewart (3)
Stoltenberg (3)
Stone (2)
Timmons (2)
Walker (2)
Webster
Wheeler
Wikstrom (3)
Wilson, A. K.
Wilson, R. C.
Woodfin (2)
Young (3)

7. *Forest industry analysis*

Armstrong
Babcock (3)
Bartlett (2)
Bethel (2)
Brandes (2)
Bryant (3)
Burks (2)
Christopher
Cohen (3)
Conway (2)
Erb
Essex (2)
Furlow
Gedney (2)
Guthrie
Hair (2)
Hall, G. R. (3)
Holmes (3)
Horn
Howard
Ibberson (2)
Jamieson (3)
King, D. B. (2)
Knorr (2)
Kramer (3)
LaBrecque
Landt
MacFarlane
McKellar
McKenzie (2)
McWilliams
Mason
May
Mead
Merrick
Meyer, W. H. (3)
Moravets (2)
Morgan, H. H.
Mueller
Nelson (3)
Neubrech
Ogden (2)
Osborne (2)
Owens
Page (2)
Peck
Pikl
Pogue
Quigley (2)
Reynolds (2)
Rowbury (3)
Samson (2)
Schrey (2)
Scott (2)
Stoddard (2)
Swain (3)
Wallace
White (2)
Wilson, A. K. (3)
Wilson, R. C. (3)
Woodfin (3)
Zivnuska

8. *Forest valuation, credit, and insurance*

Benedict
Besley (2)
Black (3)
Boutin
Bryant (2)
Cardwell
Cheston (3)
Davis (2)
Dinneen (3)
Eisenmenger (3)
Farrell
Fox (2)
Gibson
Gockerell
Grah (3)
Hall, R. C. (2)
Harkin (2)
Hayes (3)
Henley (2)
Herrick, A. M. (2)
Hopkins, D. R. (2)
Johnson
Keniston (2)
Ker
Kirkpatrick
Knorr
LaBrecque (3)
Lachance (2)
Liniger (2)
Long (3)
McClay (2)
McMurtry (2)
Meteer (3)
Meyer, W. H. (2)
Moak (3)
Muhlenberg (2)
Noblet (2)
Patterson (2)
Pogue (2)
Rowbury (2)
Sellers
Smith, J. H. G. (3)
Smith, R. C.
Somberg (2)
Staebner
Stokes (2)
Walker
White (3)
Williams (2)

9. *Forest land economics*

Anderson (3)
Aull (2)
Back (3)
Baird (2)
Barlowe
Bell (2)
Black (2)
Burks (3)
Camp (3)
Casamajor
Chase (2)
Cheston
Christen (2)
Clawson (2)
Conway (3)
Corty (3)
Cotner (3)
Coutu (2)
Davidson (3)
Davis (3)
Elchibegoff (3)
Farrell (3)
Fedkiw (3)
Flory (2)
Fry (3)
Gibson (2)
Gould
Hagenstein, P. R (2)
Hagenstein, W. D.
(3)
Hamilton (3)
Harkin (3)
Hedlund (3)
Heneberry
Hughes, J. M. (2)
Hughes, W. G.
Hutchison, O. K.(2)
James (2)
Jeffers (2)
Johnson (2)
Kelso (2)
Lachance (3)
Lammi
Lanham (2)
Lord (2)
Lundgren (3)
McGregor
McGuire
McKinnon (3)
McMahon
Marble
Mendel (3)
Metcalf (3)
Mignery (3)
Moravets (3)
Muhlenberg (3)
Myhre (3)
Palley
Parker, P. J. (2)
Pleasonton (2)
Pogue (3)
Quigley (3)
Rader (2)
Randall, A. G. (2)
Raup (2)
Reynolds (3)
Roberts (2)
Roethel (3)
Rozman
Schallau
Smith, J. H. G. (2)
Southern
Stoddard (3)
Stone (3)
Stout (2)
Swager (3)
Teeguarden (2)
Timmons (3)
Townsley (3)
Vaux (2)
Wallace (3)
Wikstrom
Wilson, R. C. (2)
Wohletz (2)
Worley (2)

10. *Economics of forestry policies and programs*

Beggs (3)
Benedict(2)
Best (2)
Bjorklund (2)
Bond (2)
Christensen (2)
Crafts
Craig, G. A. (2)
Dana
Elchibegoff (2)
Flory (3)
Gould (2)
Guthrie (3)
Hagenstein, W. D.
(2)
Hall, G. R.
Hamilton (2)
Hughes, W. G. (2)
Hutchison, S. B.
Josephson
King, D. B.
Kolbe
Larson (2)
Lord
Love (2)
Lowry
McGregor (2)
McGuire (3)
McKinnon
Mahood (2)
Marquis
Marty (3)
Mayer (3)
Miller (3)
Morgan, J. T.
Palley (3)
Pikl (2)
Pleasonton
Pringle (3)
Quinney
Rader (3)
Randall, A. G. (3)
Rettie (3)
Roethel
Rozman (2)
Schallau (3)
Scott (3)
Shideler (2)
Skok (3)
Smith, S. C. (3)
Spengler (2)
Steensen
Stokes
Stoltenberg (2)
Sullivan (2)
Vaux (3)
Voigt (3)
Wantrup(2)
Warren
Wikstrom (2)
Wilson, D. A. (3)
Winer (3)
Wohletz
Worrell
Zivnuska (2)
Zumwalt (2)

11. *Foreign forestry economics*

Bowles
Christen (3)
Craig, R. B.
Downs
Elchibegoff
Fivaz (3)
Furlow (3)
Huckenpahler
Lammi (2)
Larson (3)
Raup (3)
Stahelin
Winters (3)
Zivnuska (3)

12. *Taxation of forestry*

Aull
Barlowe (2)
Bauknight (3)
Bell (3)
Besley (3)
Casamajor (2)
Chase (3)
Corty (2)
Craig, R. B. (2)
Dane
Farrell (2)
Fox
Gaffney (3)
Gibson (3)
Grayson (3)
Hall, R. C.
Hayes (2)
Heneberry (3)
Howard (2)
Hughes, W. G. (3)
Kirkpatrick (3)
Knox (3)
Liniger
Loomer (3)
McCullough (2)
McKinnon (2)
Mahood (3)
Marquis (2)
Mesavage (3)
Muhlenberg
Raup
Rozman (3)
Sanders
Smith, R. C. (3)
Sutherland

13. *Marketing and trade in forest products*

Adams
Amidon(3)
Anderson (2)
Aull (3)
Bartlett
Beazley (2)
Bond (3)
Boutin (2)
Bowles (2)
Bruce
Brundage
Callahan (2)
Carothers
Christensen
Cohen
Davidson (2)
Donohoe
Dowdell (2)
Duerr (3)
Erb (2)
Farnsworth
Fivaz
Frazier
Gockerell (2)
Guss (2)
Henley
Herrington (3)
Holmes
Hopkins, D. R. (3)
Hughes, J. M.
Hutchison, S. B.(2)
Ibberson (3)
James, L. M. (3)
Jamieson
Kirkwood (3)
Kramer (2)
Kukachka
LaBrecque (2)
Landt (3)
Lanham (3)
Long
McCauley
McCullough (3)
McKellar (2)
McWilliams (2)
Martin (2)
Mason (3)
May (2)
Mendel
Mesavage (2)
Meteer (2)
Meyer, V. W.
Mignery (2)
Mitchell
Moak (2)
Morgan, H. H. (2)
Morgan, J. T. (3)
Mueller (3)
Natti (3)
Neubrech (3)
Newport (2)
Osborne
Ostrander
Owens
Page (3)
Parker, J. R. (2)
Perry (3)
Pfanstiel
Pratt (2)
Quigley
Quinney(2)
Riley (2)
Roberts (3)
Roethel (2)
Saucier (2)
Schrey (3)
Stevenson (3)
Stewart
Sullivan (3)
Sutherland (3)
Swain (2)
Taylor (3)
Teeguarden (3)
Thomas
Todd
Trenk
Troxell
Tubbs
Voigt
Wackerman (3)
Wallace (2)
Wantrup (3)
Warner
Wellwood (3)
Wheeler (3)
Williams
Winters
Woodbury (3)
Worley (3)
Zumwalt (3)

14. *Demand and prices of forest products*

Adams (2)
Babcock
Boutin (3)
Bruce (2)
Brundage (2)
Cardwell (2)
Christopher (2)
Cohen (2)
Crafts (3)
Craig, G. A. (3)
Donohoe (2)
Farnsworth (2)
Fivaz (2)
Gates
Guss
Guttenberg (3)
Hair
Herrick, D. E.
Holland (2)
Hughes, J. M. (3)
Jamieson (2)
Jones
Kirkpatrick (2)
Landt (2)
Lasko (2)
Long (2)
Lund (2)
McCauley (2)
McWilliams (3)
Mason (3)
May (3)
Mead (2)
Merrick (3)
Meyer (2)
Morgan, H. H. (3)
Neubrech (2)
Ostrander (3)
Owens (2)
Pfanstiel(2)
Pfeiffer (3)
Pratt (3)
Randall, W. R. ((3)
Rettie
Riley (3)
Samson (3)
Saucier (3)
Sellers (2)
Stevenson (2)
Stewart (2)
Thomas (2)
Trenk (2)
Troxell (3)
Warner (2)
Wellwood (2)
Wilson, D. A. (2)
Winters (2)
Young (2)
Zaremba (3)

15. *Economic statistics and methodology*

Back
Bamping (2)
Bethel (3)
Bjorklund (3)
Booth
Boykin (2)
Brock (2)
Coutu (3)
Findell (3)
Harrell (2)
Holland (3)
Horn (2)
James, G. W. (2)
Ker (2)
King, D. A. (2)
Lanham
Liniger (3)
Lund (3)
Ogden (3)
Palley (2)
Redman (3)
Seale (2)
Shideler (3)
Siegel (3)
Skok (2)
Steensen (2)
Stone
Swager
Taylor (2)
Warner (3)
Warren (2)
Yoho (2)
Zaremba

16. *Economic theory*

Back (2)
Bamping (3)
Benedict (3)
Boykin
Brock (3)
Callahan (3)
Carothers (3)
Dane (3)
Gould (3)
Gregory (2)
Guss (3)
Guthrie (2)
Hagenstein(3)
Hall, G. R. (2)
Harrell (3)
Heneberry (2)
Holland
James, G. W.
Kelso (3)
King, D. A. (3)
Lord (3)
Lowry (3)
McCorkle (3)
McKenzie(3)
Mitchell(2)
Parker, J. R. (3)
Parker, P. J.
Redman
Scott
Seale
Skok
Spengler
Steensen (3)
Sutherland (2)
Voigt(2)
Wantrup
Warren (3)
Webster (3)
Worrell (2)
Yoho
Zaremba (2)

FOREST DISEASE research workers attending the meeting (July 14-16) sponsored every two years by the Southern and Southeastern Forest Experiment Stations are shown discussing latest methods of combating tree infections.

Notes and Observations

Oak Wilt Spread in Control-treated and Untreated Counties in the Southern Appalachians

Slowing the spread of oak wilt (caused by *Ceratocystis fagacearum* [Bretz] Hunt) is a major forest disease control problem in the eastern United States. Although several control methods are currently being used, the information available on their effectiveness is somewhat conflicting.

One method, summer felling and spraying wilting oaks with an insecticidal-fungicidal mixture and poisoning their stumps with Ammate, has been used in North Carolina and Tennessee primarily to reduce overland spread of the wilt fungus. As a result of surveying the same control-treated and untreated counties in these States in 1954 and again in 1958, observations were made that show the effects of this control method.[1]

Greene and Washington Counties adjoin in eastern Tennessee, in an agricultural area that contains many small woodlots but relatively few large forests. Both counties were surveyed by air for oak wilt, once in 1954 and twice in 1958, using parallel flight lines spaced one mile apart. In addition, Greene County received annual aerial surveys and, beginning in 1955, most of the active wilt centers were treated. Washington County received neither detection surveys nor control treatments between 1954 and 1958.

In Greene County, active wila centers were found not only from the air but also during ground followups and revisits to all previously known centers each year. Control treatment consisted of cutting only the currently wilting trees and spraying their stems and all branches larger than about 3 inches in diameter. The spray contained 0.5 percent gamma BHC and 2 percent pentachlorophenol in No. 2 fuel oil. Stumps were treated with Ammate to prevent sprouting.

The spray treatment reduces insect infestation of bark and wood as well as of mats of the wilt fungus that may form on the stems and larger branches of infected trees within a few months after cutting them.[2] It is likely that most overland spread of oak wilt is the result of contaminated insects carrying *C. fagacearum* from diseased to healthy trees.[3]

The criterion used to evaluate overland oak wilt spread in the above-mentioned counties is the number of new infection centers found for a given year. For this purpose, a new infection center is defined as a single wilting oak or wilting oaks within 50 feet of each other that show symptoms for the first time during the current year. It contains no stems or stumps of oaks that could possibly have been killed by wilt. In other words, the center could not have originated through root transmission of the wilt fungus from a previously diseased tree or trees unless there was hidden infection in a neighboring oak. Many factors influence overland oak wilt spread, as judged by the number of new centers in a given area. They include the amount and distribution of inoculum and the populations of insect carriers.

The Greene County results can be compared with the Washington County results for 1954 and again for 1958. However, for each county individually, the increase in new centers from 1954 to 1958 is not reliable because the survey was more intensive in 1958. The number of new infection centers per 100 square miles was about the same in both counties in 1954, but there was a marked difference between the counties in 1958 (Table 1). There were about three times as many new centers in untreated Washington County as there were in Greene County, which had had 3 years of oak wilt detection and control efforts.

Data for a two-county area in western North Carolina are also included in Table 1. Beginning in 1954, these counties, which adjoin each other, annually received complete aerial coverage, ground followups, and revisits to all known wilt centers. Active centers were control-treated each year. There was practically no increase in the number of new centers found in 1958, compared with those found in 1954. The results for the North Carolina counties are not strictly comparable with those for the Washington County, Tennessee, check area because the former were surveyed by the North Carolina Division of Forestry, which used somewhat different aerial procedures than the U. S. Forest Service crews that surveyed the Tennessee counties.

It is interesting that both the North Carolina counties and Greene County, Tennessee, had the same number of new centers in 1954. After 3 years of detection and control efforts, there were more

[1] Surveys in Tennessee were conducted by the Southeastern Forest Experiment Station, U. S. Forest Service, under the supervision of W. A. Stegall, Jr. Control treatments were performed by the Tennessee Division of Forestry, under the direction of Ralph B. Quillin. Surveys and control treatments in North Carolina were carried out by the North Carolina Division of Forestry, under the supervision of H. J. Green.

[2] Boyce, John S., Jr. Spraying logs of oak wilt trees to reduce infection hazard. U. S. Forest Service, Southeast. Forest Expt. Sta. Res. Note 52, 2 pp. 1954.

[3] Himelick, E. B., and E. A. Curl. Transmission of *Ceratocystis fagacearum* by insects and mites. Plant Dis. Reporter 42: 538-545. 1958.

TABLE 1.—NEW OAK WILT CENTERS IN CONTROL-TREATED AND UNTREATED COUNTIES IN NORTH CAROLINA AND TENNESSEE

County	Area	Control	New centers per 100 sq. mi.	
			1954	1958
	Sq. mi.		*Number*	*Number*
Buncombe and Haywood Counties, North Carolina	810	Begun 1954	1.2	1.4
Greene County, Tennessee	581	Begun 1955	1.2	4.5
Washington County, Tennessee	282	None	1.1	14.5

new centers per unit area in Greene County than in the North Carolina counties. The difference was greater than survey procedure differences alone in 1958 would explain. This may be partly because Greene County is surrounded by counties in which oak wilt is common and largely uncontrolled. The North Carolina counties are surrounded by counties in most of which there are no known wilt centers, although the counties have been repeatedly surveyed by airplane.

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Growth of Four Southern Pines in West Tennessee

Longleaf pine (*Pinus palustris* Mill.), slash pine (*P. elliottii* Engelm.), loblolly pine (*P. taeda* L.), and shortleaf pine (*P. echinata* Mill.) were planted on four contiguous ½-acre plots near Jackson, Tennessee, nearly 30 years ago. The performance of these plantations is of particular interest because all but shortleaf pine are well beyond their native range and because they are the oldest well-documented plantations of southern pines in the western part of the state (*2*).

The Division of Forestry of the Tennessee Department of Conservation established the plantations at its former Madison Nursery in March and April of 1929. The loblolly seedlings were 1-0 stock grown locally; those of the other three species were 1-0 stock from a North Carolina nursery. There are no records of the geographic sources of any of the seed.

The seedlings were planted with grub-hoes, on abandoned agricultural land, at 6- by 6-foot spacing. All the plots are on a ridge with a Loring silt loam soil 4 to 5 feet deep. At time of planting, the loblolly, shortleaf, and slash plots were sheet-eroded and slightly gullied; 50 to 75 percent of the topsoil had been lost. The longleaf plot had extensive shallow gullying, and 75 to 100 percent of its topsoil was gone.

Rainfall in this area averages 52 inches a year, half of which is well distributed throughout the March-to-September growing season. The average annual maximum temperature is 100°F. and the average annual minimum 5°F. Sleet storms occur about once in four or five years. Annual snowfall averages 6 inches.

The measurements summarized here were taken on ¼-acre plots surrounded by 4-row isolation strips in the loblolly, longleaf, and shortleaf stands, and on a 1/10-acre plot in the slash stand. Huckenpahler's report (*2*) of the plantations at age 19 is based on measurements of the entire half-acre plots. Sampling variation and edge-effect somewhat mask the changes between the two inventories.

Up to age 19, longleaf and slash had suffered far more mortality than loblolly or shortleaf, but this trend was reversed in the next 10 years. Most of the post-1948 mortality in all species could have been prevented or greatly reduced by thinning or by deadening the competing hardwoods, which are particularly prevalent on the shortleaf and slash pine plots. Diameter growth during the last ten years has been slow for all species—about 1¼ inches for the loblolly and shortleaf and about 2 inches for the longleaf and slash pine.

Comparisons with the basal areas of so-called normal stands (*3*) reveal that the loblolly pine plantation has 35 square feet per acre more basal area, the longleaf plantation has 21 square feet more, and the shortleaf and slash pine are "normal." The loblolly plantation has 90 more trees per acre, the longleaf plantation 295 fewer, the shortleaf plantation 580 fewer, and the slash plantation 100 fewer than shown in the normal-yield tables.

Site index was determined from Coile's and Schumacher's (*1*) curves for loblolly and shortleaf, and from the U. S. Forest Service's Miscellaneous Publication 50 (*3*) for longleaf and slash pine. The loblolly, longleaf, and shortleaf dominants all grew approximately 15 feet during the last decade, while slash grew 20 feet. The loblolly, longleaf, and slash plantations are now quite similar as to site index—75, 80, and 78, respectively. Shortleaf during the last ten years apparently grew tall enough to escape the tip moth (*Rhyacionia frustrana* Comst.) which seriously reduced its early height growth. As a result, the site index of the shortleaf plantation jumped from 50 to 60 during the last decade—an indication that the true index for shortleaf unaffected by tip moth might be 70 or better.

Stand volume at age 29 is good but not spectacular. Growth of longleaf and slash pine was slowed by early understocking; that of shortleaf by poor height growth during the first two decades; and that of loblolly by early overstocking.

In general, the loblolly plantation looks good but urgently needs heavy thinning to stimulate the diameter growth of the 8-, 9-, and 10-inch trees that will be the sawlog crop trees of the future. Crowns of the dominants and codominants are healthy although shorter than

TABLE 1.—STAND CHARACTERISTICS PER ACRE OF 29-YEAR-OLD LOBLOLLY, LONGLEAF, SHORTLEAF, AND SLASH PLANTATIONS IN WESTERN TENNESSEE

Item of comparison	Loblolly	Longleaf	Shortleaf	Slash
Trees living (no.)	692	396	892	590
Survival (percent)	57	33	74	49
Basal area (sq. ft.)	178	143	158	156
Avg. d.b.h. all trees (in.)	6.9	8.1	5.7	7.0
Avg. d.b.h. all merch.[1] trees (in.)	7.3	8.6	6.3	8.4
Avg. ht. dominants (ft.)	56	58	45	62
Site index (ft.)	75	80	60	78
Volume (cu. ft.)	3,233	2,906	2,080	2,683
Volume (cords)[2]	42.8	38.5	27.5	35.5
Growth per year (cords)	1.5	1.3	1.0	1.2

[1] 4.6 inches d.b.h. and larger.
[2] 75.5 cu. ft. per cord.

one would like. Without thinning, heavy mortality will occur in the 3-, 4-, and 5-inch d.b.h. classes in the next five years.

Many of the shortleaf crowns have an unhealthy color and unusually short needles. Stagnation appears to be imminent unless the stand is thinned, but heavy mortality may not occur for some time, as shortleaf is slow to succumb to suppression.

The longleaf plantation is outstanding. Rough and limby though the larger trees are, this is the best longleaf plantation in west Tennessee or north Mississippi. The abundant litter under this stand is impressive, especially to those interested in erosion control.

More than any of the others, the slash pine plantation lacks uniformity. Although dominance was expressed early and growth has been good, a surprising number of 3- and 4-inch suppressed trees are still alive.

While their performance justifies additional tests, neither slash nor longleaf can presently be recommended for large-scale planting in this area. As other studies have shown (*4*), survival is generally poor—often only 10 to 20 percent. Damage from sleet and snow is a considerable hazard also, though these particular plantations have escaped.

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Preliminary Report on Red Pine Nursery Stock Fumigation

Following the discovery of the European pine shoot moth, *Rhyacionia buoliana* (Schiff.), in the Michigan Conservation Departments nurseries in the fall of 1957, a fumigation program was set up to prevent shipping live shoot moth larvae from the nurseries. As far as could be determined, except for the experimental work of Dr. H. A. U. Monro of the Canadian Department of Agriculture, the use of fumigants on bundled, dormant, red pine nursery stock had not been tested before. Dr. Monro very kindly sent his unpublished recommendations for treating the stock and later helped evaluate the efficieney of the fumigation chamber.

At the Higgins Lake Nursery near Roscommon and Wyman Nursery at Manistique, fumigation chambers of 600 cubic foot capacity were built. These were made of plywood and measured about 6½ x 8 x 12 feet. A small chamber with a 250 cubic foot capacity was used at the Hardwood Nursery at Boyne Falls. The cost of materials and labor for the larger chamber was about $150. This capacity will accommodate approximately 150,000 2-0 seedlings; 60,000 3-0 seedlings; or 20,000 2-2 transplants at one time.

Normal lifting, sorting, and packing procedures were followed giving open end bales with the pine tops exposed. After the bales were ready for shipping, they were placed in the fumigation chamber and methyl bromide gas was introduced, following the safety precautions suggested by the manufacturer. Generally, a two-hour exposure period was used. At 60°F. 4 pounds of pure methyl bromide per 1,000 cubic feet were used. As the air temperature decreased, the amount of gas was increased. The cost for the methyl bromide is less than $.04 per thousand trees.

During the fall of 1957 and spring of 1958, over eight and one half million red pines were treated before leaving the nursery. In addition to those receiving the regular treatment, several bundles of 50 red pine were experimentally treated with varying dosages of the fumigant by leaving them in the chamber for two or three treatments periods, and then planting them. Jack pine and white spruce were also treated in test quantities and planted to determine the effect on these species.

On the basis of analysis of shoot moth mortality in the bundled stock, and observations and measurements of tree growth and mortality on regular plantings and test plantings, the following conclusions were made:

1. The dosages of methyl bromide recommended by Dr. Monro were sufficient to kill the shoot moth larvae when the temperatures were above 50°F. Below this temperature some survival occurred. Presumably, this was due to loss of gas by sorption into the walls of the chamber and to slow or incomplete vaporization of the methyl bromide. This can be corrected by painting the inside of the chamber with a resin base paint, heating the evaporating pan for more rapid

vaporization, and perhaps increasing the dosage.

2. There was no difference in tree mortality between those receiving the recommended treatment and those not treated. Exposing the trees for two or three treatments caused some tree mortality.

3. Terminal growth of the living trees averaged almost the same for those subjected to various treatments and the untreated stock. In some cases where the new growth had started before fumigation, the growing buds were injured. However, side buds usually took over and grew about the same as uninjured terminals.

4. Jack pine appears to be less susceptible to methyl bromide injury than red pine, and white spruce more susceptible.

On the basis of work to date, it therefore appears that fumigation of bundled stock with methyl bromide offers a safe, inexpensive, simple method of preventing shipment of live larvae in nursery stock from the nursery, and can be recommended when a nursery bed spray program fails to eradicate all shoot moth larvae.

PAUL R. FLINK and PAUL M. BRIGHAM

Respectively, forest entomologist and superintendent of Higgins Lake State Forest Nursery, Michigan Department of Conservation, Lansing

The "Tape-N-Shape"—A New Chain Handler

Figure 1 depicts a new tape handler which was designed by the author to facilitate taking up, letting out, and carrying any ¼ inch or 5/16 inch steel band chain. With this light, compact, and inexpensive device, even a beginner can take up and throw a tape into a neat, kink-free coil. Indeed, the tape handler will keep a tape in as good condition as will a heavy cumbersome reel, and it is easy to use. It is fabricated out of a heavy gauge tin by means of solder. It may also be constructed from plastic very easily. The inside groove, where the tape is laid, is curved the same as the outside dimensions indicate to conform with the degree of curve of the tape as it is being thrown. The handle is attached to the handler by solder also.

Here are the simple steps in its use:

1. Hold the tape handler in the left hand with three fingers through the loop. Then as the tape is laid in the guide with the right hand, grasp it with the index finger and thumb of the left hand (Fig. 2*A*).

2. When the entire length of the tape is looped into the tape handler (Fig. 2*A*), lash the tape with the rawhide before it is removed.

3. Take the lashed tape from the handler and throw it in the conventional manner.

4. Place the thrown tape back in the tape handler, and fasten the handler to the tape with a few turns of rawhide. The tape may now be attached to a belt clip for carrying (Fig. 2*D*).

The "Tape-N-Shape" also provides a convenient method of applying tension to a tape. This eliminates cutting and chaffing of the chainman's hands by the rawhide when stretching the tape.

Figure 2*C* shows how simply the tape is fastened to the handler.

For precise work, a spring balance can be clipped to the handle and the tape held as shown in Figure 2*B*.

GARY D. SCHLAEGER

Class of 1960, Department of Forestry, Purdue University, Lafayette, Ind.

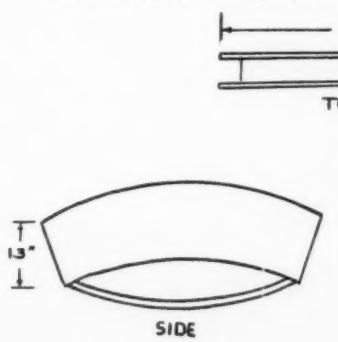

FIG. 1.—(Below) Design of a simply constructed tape holder and handler.

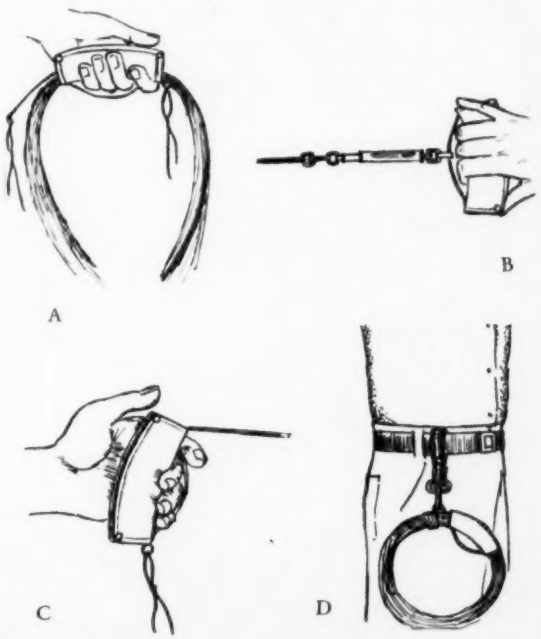

FIG. 2.—(Right) Various steps in use of tape handler.

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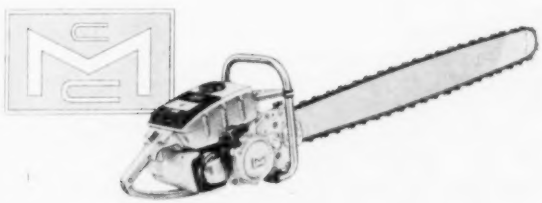

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Points of View

Comments on "The Divergent Points of View of Forest Geneticists and of Agronomic and Horticultural Crop Breeders"

Inman asserts in the May issue of the JOURNAL[1] that forest tree breeders are using faulty procedures and ignoring agronomic and other crop breeding experiences. As an editorial springboard he uses an article by Duffield and myself which appeared in the November issue. As a practicing tree breeder formally trained in agronomic crop breeding, I appreciate Inman's viewpoint, and am glad to discuss it.

In support of his assertations, Inman points out: (1) The scarcity of non-forestry citations in forest genetics literature, (2) lack of genetic training for professionals, (3) failure to realize how similar forest breeding problems are to those of other organisms, (4) too great involvement with biology and culture, (5) too much emphasis on fundamentals long since clarified with other organisms, (6) the use of methods, such as mass selection, long since discredited, and (7) the practicing of too close a selection to type. He also believes (8) that programs based on phenotypic selection of individual parent trees are of dubious value and (9) that a present specific lack of knowledge of tree genetics is not important for current success in breeding. The writer will try to answer these charges.

1. No attempt will be made to answer objectively the assertion that a scarcity of non-forestry citations exists since a statistical survey would be needed to do this. While agreeable to diversification of literature, I do not believe this should be achieved at the expense of pertinence. Articles on sugar beet breeding generally refer to sugar beets. At any rate, this type of index is of dubious value. Most forest tree breeders are widely read in agronomy and horticulture.

2. Contrary to Inman's statement that genetics and plant breeding are subordinated, Ph.D. requirements in forest genetics of all schools include ample courses in these subjects as well as animal breeding, biometry, etc. The training of a student is evaluated partly on the all-around rating of a graduate school in agricultural and biological sciences other than forestry.

3. Inman glosses over the advantages, problems, and complexities of forest tree breeding as compared to other crops. That there are differences and that these differences profoundly affect breeding procedure is taught in university plant-breeding courses. Larsen and Righter, as cited in Duffield and Snyder, stated, in effect, that forest tree breeders should not adopt inbreeding, as practiced for hybrid corn, as a standard breeding procedure. The reasons are clear: It is unnecessary to have crop uniformity with forest trees, it is unnecessary to inbreed for reproducibility since parent trees can be maintained vegetatively, and it is undesirable because of the time element. To the writer, this does not seem to uphold Inman's contention that forest geneticists believe: "the problems of hereditary forest improvement are so difficult and so different that little is to be learned from agronomic and horticultural experience." Rather, it seems to support one of Inman's truisms: "Forest tree breeders cannot expect to apply successfully in a cookbook manner the adaptations of breeding methods used for the improvement of corn, forage crops, or any other crops." There are other obvious differences which likewise influence the actions of the forest tree breeder such as the time for evaluation of mature stands, the variety of pests and other hazards which can befall in the course of years, the size of the organism, and the space necessary for testing it. While these are chiefly of a practical rather than a fundamental nature, they nevertheless have a profound effect on procedure.

4. Inman recognizes that involment with non-genetic research such as the biology, culturing, grafting, etc., of trees dilutes the forest genetics effort and that with other crops, breeders are not so involved. With forest trees again, the situation is different. The amount of past and present forest research is not comparable to that of even most minor crops and the methods for refined culture necessary for breeding are of little commercial importance in the forest. Therefore, such information and methods are simply not available to the forest tree breeder. He must dig them out himself, or lack of them will be an insurmountable obstacle to his research.

5. Inman's example showing that forest scientists are still concerned with fundamentals settled by agronomic and horticultural crop breeders years ago is particularly weak, consisting of comments on a recent criticism by a forest geneticist of some old unreplicated field trials. These trials were established in Europe prior to the statistical era and do not at all represent modern methodology.

6. Inman implies that breeders are wasting money in mass selection. This procedure is the one

[1]Inman, L. I. The divergent points of view of forest geneticists and of agronomic and horticultural crop breeders. Jour. Forestry 57: 375-377.

used when selected trees are left for seed trees or for a seed production area. Geneticists agree that for many purposes this is a relatively inefficient method. However, comparatively little extra expense and very little of the breeder's time go into this stopgap procedure.

7. The charge that the profession is selecting "too close to type" mystifies me. Inman is right for denouncing the method but where is it being practiced? Do not foresters tolerate the present heterogeneity of the forest and even aim for future heterogeneity? Inman's point is accepted more as a caution than as a charge. Tree breeders should avoid the pitfall of a single type. Since we can't at present include all the genes which will protect our trees from unpredictable catastrophies that can befall a stand, we can only hope that a heterogeneous crop will be adequately buffered against such happenings.

8. He lists multiple reasons why the plus-tree selection and seed orchard program is incorrect. His argument is that the genotypes cannot be recognized with sufficient accuracy by looking at the phenotypes. In building his case, he excerpts a statement from Snyder and David's text, page 226, which is somewhat misleading and could be taken as a negation of the whole of genetics if left out of context. The statement is: "One of the oldest fallacies of heredity and one of the hardest to eradicate is the belief that *like produces like.*" The quotation should continue: "Our previous study of genetics has shown us that heterozygous animals produced varied offspring. The statement may be made correct by changing it to *like genes produce like genes.* It is the genes, then, not their phenotypic expressions, which must be the basis of selection. The modern genetic type of selection does not place the emphasis on the appearance of the individual or on the ancestry, although both may be taken into consideration. Instead the emphasis is placed on the progeny." This does not say or mean, however, that phenotypic selection is without value and no forest geneticist will disagree with the above quotation. It is interesting that it recommended that both the phenotype and the ancestry be taken into consideration. In many tree breeding projects, a measure of excellence of ancestry is also used. This occurs in even-aged natural stands which are considered to consist of collateral relatives such as sibs, cousins, etc. The breeder evaluates his selection partly on the basis of the neighboring tree relatives. The forest geneticist is not de-emphasizing progeny testing. In all the projects criticized by Inman, progeny testing is proceeding as fast as possible. In does not make sense, however, to sit around till these progeny grow up and can be evaluated before making use of the selected parents in seed orchards for their known and probable benefits.

The chief of the known benefits is to obtain offspring with better form. Numerous tests have shown that these characters have a high heritability. We could also mention oleoresin, disease resistance, and some other special characters. Probably also increases in wood quality will be realized. The writer will agree with Inman that increase in growth rate is a dark horse. Breeders of many other crops have tried and given up selecting for vigor of growth on the basis of its phenotypic evidence in single parent plants and there are few data concerning the effectiveness of phenotypic growth rate selection for trees. Doubt on this point, however, need not deter the program, since, in addition to the immediate benefits listed above, the clonal seed orchards perform an efficient step in progeny testing. The selected material is here brought together and the ramets of the clones can act as parents either in a polycross progeny test or in a controlled pollination program. Additional evaluation is gained through a comparison of the clones. Selection must begin somewhere and what better place is there in which to look for trees of high inherent growth rate or trees with a high combining ability for it than in those already exhibiting good form and other desirable characteristics? It does not seem important that a little extra effort has been spent in selecting trees which also have a high apparent growth rate.

The seed orchard, however, should not be the sole or even the largest part of the breeding programs. It should be considered as the part most likely to give quick results and at the same time to serve as a step in an auxiliary progeny testing program. Many more trees should be tested than it is possible to place in seed orchards. Their combining ability should be examined by a one-parent progeny test. This test would include trees selected for seed orchards. Preferably all selections should be preserved by grafting but in smaller quantities and with less planting space than is used for seed orchards. Vegetative preservation is essential since there is no guarantee that an unusually favorable gene combination for high combining ability for a character as complex as growth rate, present in a certain parent, can be recovered in later generations. Geniuses are hard to come by! It would be a shame to identify a superlative parent by progeny testing and then find it had died. The breeder must be in position to place such tested parents in clonal seed orchards and further genetic tests.

9. The most dangerous of Inman's statements is that basic genetic knowledge of the forest species is not essential for their improvement. He lists progress with alfalfa and small grains in the absence of much genetic knowledge as examples. The writer suspects that a great deal more genetic information is available in these crops than appears to the non-specialist and that such information is relatively large compared to the embryonic status of forest genetics. That more genetic information is not available for these particular crops may more properly be attributed to their difficult polyploid nature than to lack of experimenta-

tion. Is it by coincidence that, where genetic information is the most extensive, i.e. with maize, the most progress has been made? Even for this crop, G. F. Sprague stated: "Standard breeding and testing procedures have been effective in establishing hybrid corn on a firm economic foundation. However, it does not necessarily follow that this is conclusive proof of the efficiency of the procedures used." Finally, I'd like to quote from a letter received from a prominent genetics department head who has given permission to quote him concerning Inman's article: "I am in no position to state that the basic genetic information available on other crops will be applicable with forest species. For this reason, I think there is every reason to justify enough basic research in quantitative genetics and cytogenetics in forestry to verify or contradict such beliefs. Very little is to be gained in spending time in this argument without more information than is presently available." Certainly no crop breeder would advise against learning every possible detail concerning heritability, gene groupings on chromosomes, and other basic knowledge on which ultimate progress must lie.

In conclusion, while disagreeing with some of Inman's "proofs," the writer accepts most of Inman's main ideas as constructive and worth consideration by every forest tree improvement worker. His main theme is especially valuable: "The fundamental principles of plant breeding and genetics are the same for all species, but the best methods of their application must, of course, be adapted to the biological and cultural characteristics of the species." He is to be congratulated for accepting the suggestions of some forest tree breeders to put his ideas in print.

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The New Challenge To Forestry

Under the current proposal to create a Great Basin National Park in eastern Nevada, Wheeler Peak and some 220,000 acres of national forest land in the neighboring Snake Range would be transferred to the jurisdiction of the National Park Service. Strong nationwide support makes this transfer seem not unlikely.

The implications of this proposal are obvious. A substantial and influential segment of the public is convinced that the present custodians of the Snake Range are not managing the land in the best interests of the nation as a whole. The Forest Service, and by implication the entire forestry profession, has evidently failed in this instance to sell its philosophy of multiple use.

The objections to transfer have been well summarized by C. J. Olsen.[1] Establishment of a national park would mean the end of orderly timber harvest. It would mean that grazing of domestic livestock would be prohibited, as would mining operations. Positive action to manage watersheds so vital to arid eastern Nevada would be forbidden, along with hunting of deer and other game. All these forms of land use are carried out today; all are coordinated, at least in theory, so as to secure for the public the greatest total benefits from the lands of the Snake Range. Establishment of a national park would mean the end of multiple use and its replacement by management for just one of the present uses of the range: recreation.

Much of the local pressure for this change comes from Chambers of Commerce and others who hope that the magic words "national park" will bring an influx of tourists to their areas and dollars to their pockets. Widespread national support, however, has come from intelligent conservation-minded laymen who are convinced that establishment of a Great Basin National Park is clearly in the public interest. Their reasons are worth examining.

The original intent of the national park system was to preserve for posterity areas of unique scenic or historical importance. No claim of such unique importance is made for the Snake Range. Rather, it is said to include "a characteristic kind of western scenery now lacking in the Park Service that should be added while there is still time." Plainly, the park proponents feel that under the present administration of the land this characteristic scenery will not long remain.

Part of the trouble lies in a failure to inform the public about modern land management. Despite years of education even the interested public has little idea of what forestry really is. To most, it is little more than fire-fighting and the Save-the-Redwoods League.

Perhaps the critics are right—perhaps there is something wrong with the foresters' management concepts, not only in the Snake Range but on much of the nation's forest land.

The principal criticism has been that foresters, public and private, are too exclusively concerned with economic returns, with getting the logs out of the woods. Other uses and other users of the land are tolerated, but only so long as they do not get in the way of production. There is something to this complaint.

The management plans and the publicity releases of the public forests, emphasize multiple use, particularly the importance accorded to watershed protection and to recreation. The orientation of the forester on the ground, though, is more often than not almost exclusively toward silviculture and timber harvest. This is understandable, for here is where the money is. Even in the forestry schools,

[1] Olsen, C. J. 1959. The proposed invasion at Mt. Wheeler. Amer. Forests 65(2):16-19, 40-42.

only a few students are really made aware of the importance to the public welfare of watershed management, recreation, and wildlife management. In the minds of many foresters, these are land uses to be relegated to those odd corners of their domain that are unusable for timber harvest.

Foresters must learn, as they too often have not, to consider the land entrusted to their care as an organic whole, and to manage it to provide the optimum in quality of living for mankind. Management in this sense may mean leaving great wilderness areas strictly alone, or it may mean planning logging operations so as to leave an improved habitat for wildlife and improved scenic areas. Foresters have been so busy selling the dollars and cents advantages of conservation practices that they have too often forgotten what resource management really is. Now, more than ever, we need to develop what Aldo Leopold called an "ecological conscience."

The Great Basin National Park proposal is not an isolated phenomenon, to be argued and decided solely on its own merits. Rather, like the clamor over the Wilderness Bill, it is a symptom of deep dissatisfaction in some quarters with the foresters' stewardship of the land. The ultimate fate of the Snake Range is not particularly important in itself. However the controversy is decided, the land will be in good hands and the national interest will be well served. The principle — the question of multiple use versus single use management—is important.

For sixty years foresters have provided the primary leadership in the conservation movement. Unless we who call ourselves foresters concern ourselves more with multiple use management, with quality of living as well as with wood and water, we may find our hard-won leadership taken from us. Not only we but the nation would be the loser.

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Comments on Professional and Subprofessional Strata Within the Field of Forestry

It was an interesting coincidence that two distinguished foresters, Kenneth P. Davis and John W. Duffield, in the May JOURNAL OF FORESTRY,[1] called for the consideration of dividing the field of forestry into subprofessional and professional parts. The main theme of each author was concerned with forestry education. Each, however, pointed out the need for professional and subprofessional strata. While a need for such stratification may eventually arise, its consideration at the present time seems to put the cart before the horse.

Forestry still has not achieved complete recognition as a full-fledged profession. It is unlikely that it would make its striving for recognition any easier by dividing itself into professional and subprofessional strata. The difference would perhaps be apparent to foresters themselves. But, would it be apparent to many employers who as yet do not accept forestry as a profession? For contrary to Dr. Duffield, I believe the market for inadequately educated foresters is not evidence of a demand for men with ranger type training but rather a result of inadequate recognition of forestry as a profession. At the present time many men with master's degrees are employed in what we as foresters would term subprofessional work. Would the development of a subprofessional group to replace these men guarantee the professional foresters higher paid and more responsible positions? Probably not until their worth as real professionals is generally accepted.

What is really needed is to gain general acceptance of forestry as a profession. The Society should fully concentrate on achieving this goal. How best to achieve it should be continually and forcibly aired throughout the Society and a course of action decided upon. Strengthened education is certainly one step. Licensing, employment sanctions or Society membership sanctions as mentioned by Dr. Duffield are other possible courses. Whatever the means, let us continue to build and develop professionally before we concern ourselves with distinctions between professional and subprofessional foresters.

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[1] Davis, Kenneth P. Council's Column. Jour. Forestry 57:381-382. Duffield, John W. What kind of forestry schools? Jour. Forestry 57:374-375. 1959.

Attention Called to Seed Testing Studies

I would like to call attention to some of the important findings on seed testing research studies that C. E. Heit, seed technologist of the New York State Agricultural Experiment Station, has recently presented in a paper before the forty-eighth annual meeting of the Association of Official Seed Analysts. The paper, entitled "The Effect of Light and Temperature on Germination of Certain Hard Pines and Suggested Methods for Laboratory Testing," was published in the 1958 Proceedings of the Association.

We have all become more conscious of tree seed quality in the past decade. With the intensive investigations made by Mr. Heit for over 18 years in testing seed germination, reliable standards could be adopted.

Mr. Heit's main point is that a knowledge of the reaction of seed to temperature and light makes prechilling or stratification of certain hard pines for accurate, maximum germination unnecessary. The laboratory germination procedure used is an alternating tem-

TABLE 1.—SUGGESTED METHODS OF RAPID AND MAXIMUM LABORATORY GERMINATION OF CERTAIN HARD PINES

Kind of seed	Temperature	First count,[1] days	Final count, days	Comments
	Degrees C			
Pinus banksiana	20-30	7-10	14	Artificial light[2]
Pinus contorta latifolia	20-30	10	21	Artificial light
Pinus densiflora	20-30	10	21	Artificial light
Pinus mugo	20-30	7-10	14	Artificial light
Pinus nigra	20-30	7-10	14	Artificial light
Pinus resinosa	20-30, 25	7-10	14	Light not essential
Pinus rigida	20-30	7-10	14	Artificial light
Pinus sylvestris	20-30	7-10	14	Artificial light
Pinus thumbergii	20-30	10	21	Artificial light
Pinus virginiana	20-30	7-10	21	Artificial light

Note: Seeds tested on top of blotters.
[1]First count should not be taken until growth has developed far enough for correct interpretation of normal seedlings.
[2]Artificial light refers to light being present at the 8-hour high temperature period.

perature of 8 hours at 30 degrees centigrade plus artificial light followed by 16 hours at 20 degrees without light. He has shown that this method results in highly successful seed germination of 10 species of hard pine, with no prechilling required, and with test durations of only 14 to 21 days. Suggested germination conditions for rapid and maximum germination of certain hard pines is reprinted in Table 1.

Results under these conditions for more than 10 years at the Geneva laboratory, where complete success has been obtained, proved that there is no need for long test durations with any of the hard pines mentioned when optimum temperature and light conditions are maintained as suggested. Accurate germination values of these hard pine seed can be reported in a short period of time. This is of prime importance to the seed collector and dealer in their sale or distribution programs, and to the nurseryman or private planter for a buying and sowing guide.

Mr. Heit also summed up studies on variation in germinative response due to seed source. Three figures presented showed striking differences in actual seedling response in light and dark at 20-30°C for four species. The literature cited lists several other published articles on tree seed germination including the results of many years' studies by the author of the embryo excision method for testing extreme dormant seed for germination.

Anyone may obtain a copy of the original article by writing to the Department of Seed Investigation, N. Y. State Agricultural Experiment Station, Geneva, N. Y.

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Survival and Growth of Pot-Bound Seedlings

The picture published in the November 1958 JOURNAL[1] of a seedling with pot-bound roots, which originated with us, caused some perturbation among the contact men of the pulp and paper companies cooperating in our Forest Genetics Research Program. They have persuaded me to sacrifice a couple of young living trees from the same stock, after outplanting a year, and investigate their roots.

These trees from the same stock, in the same size pots the same length of time as your "horrible example," all looked like it at the time of outplanting, and all the 51 trees are surviving a year after outplanting. The roots of these two were carefully washed with running water as they were unearthed, to obtain all of the roots without damage.

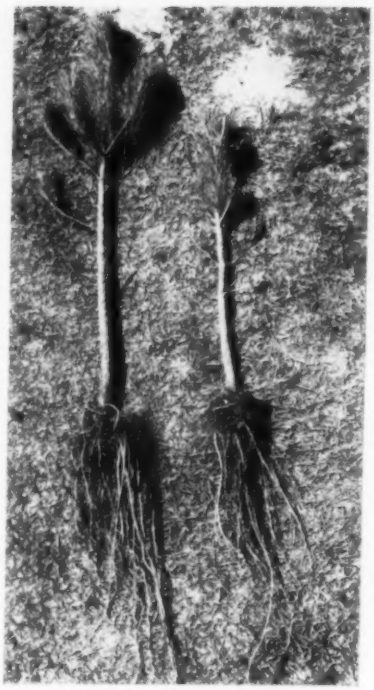

FIG. 1.—Root systems of potbound seedlings one year after outplanting.
Photo by J. W. Willingham, Univ. of Florida.

The smaller tree was selected as an average of 25 trees planted at the same time, with standard fertilization as practiced in many of our cooperating companies in their seed orchards, and they were watered when dry during the first growing season after outplanting.

The larger tree was selected as an average of 26 trees planted in a single row three feet apart, as a windbreak on the crest of a sandy ridge of Lakeland Fine Sands, with deep fertilization and never watered. They average 1 foot 2½ inches taller and .339 inch larger in diameter one foot above the ground than the normally fertilized trees.

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[1]Zobel, Bruce J., John Barber, Claud L. Brown, and Thomas O. Perry. Seed orchards—their concept and management. Jour. Forestry 56:815-825. 1958. P. 819.

Book Reviews

Forest Fire: Control and Use

By Kenneth P. Davis. 584 pp. Illus. McGraw-Hill, New York. 1959. $12.

Davis' book is welcome, indeed. More than half a century has passed since fire control became an organized activity of the federal Forest Service, and academic work in forest protection has long been a required part of the accredited forestry curriculum. It is, therefore, hardly comprehensible that this year marks the publication of the first hard-cover textbook devoted solely to the control and use of fire in the forest. The fact that it is so long overdue should not dim our gratitude for the fine job that it is. It will provide a needed stimulus to fire-control instruction and will provide a handy and useful reference and refresher manual for the field man.

It is not an easy task to write a new text in a field as varied and complex as fire control; it is a tribute to the author's knowledge and skill that the book is generally successful in accomplishing his stated purposes. The organizational tree is logical: the text flows easily and readably from considerations of fire effects and behavior, through the organizational aspects of fire control, to the use of fire in land management. But some of the branches are much stronger and more solidly attached than others. Comments that follow stem largely from my use of the book during my spring semester course in fire control.

Davis is at his best when he is dealing with the social and organizational aspects of the field. His chapter on fire control objectives is a succinct and lucid discussion of a difficult subject. Here, for the first time, is an analysis that puts the varied aspects of answering the question "How much fire control?" into perspective that is at once understandable and enlightening with its insights. The chapters on building and operating a control organization are equally informative and well-written. Emphasis in these chapters is properly on the underlying principles, with examples used to illustrate the fundamentals.

Case studies are used to illustrate the practice of fire control. Although they make interesting reading, they are not well adapted to classroom use. Graded fire problems, used successfully in recent Forest Service national fire training schools, would enable the student to put together the previously-studied material in meaningful tests of his comprehension and skill. It might even be desirable to relegate this material to an adjunctive manual of laboratory exercises.

Chapters on prevention, detection, suppression methods and control-line construction are adequately professional and informative. Details on types of plows may seem tedious to some readers; but others may find this information most valuable. At any rate, one can ignore the portions of less immediate interest.

In the technical aspects of fire behavior, Davis is on less sure ground. In recognition of this fact, he obtained the services of two highly qualified professionals to prepare material on fire behavior and fire weather. George Byram, member of the Southeastern Forest Experiment Station's fire research staff, wrote chapters on combustion of forest fuels and forest fire behavior. W. R. Krumm, fire weather forecaster for the northern Rocky Mountain Region, prepared the chapter on fire weather.

Byram's material on the combustion of forest fuels is first-rate. It is a mystery to me how one can be expected to understand the principles of behavior and suppression without knowing something about the fundamentals of combustion. And yet this subject has been completely neglected in most of the published material on fire behavior. The excellent discussion of the combustion process and its implications for fire behavior and suppression should be required reading for all fire control personnel. I am puzzled, however, by Byram's treatment of fuel-water relationships. He appears to take for granted that the reader is already familiar with the basic relationship between equilibrium moisture content of cellulosic materials and ambient temperature and relative humidity. Nowhere in this chapter, or elsewhere in the book, is this relationship made explicit, certainly a grievous oversight.

The second of Byram's chapters, on forest fire behavior, is considerably less appropriate and satisfactory. A textbook should present a synthesis of known and verified material. It is not the place for the exposition of new theories. Unfortunately much of this chapter falls in the latter category. Portions of Byram's material on the behavior of large fires is speculative and controversial, and has not been confirmed by independent investigation. Furthermore, some of it is essentially unverifiable by the reader. For example, the derivation of his "energy-criterion" equations is not given; neither is a reference given where the derivation can be found. I am not complaining so much about Byram's ideas, which are highly imaginative and even brilliant; but about their inclusion in a textbook where they are likely to be accepted as proven fact.

A chapter on fire weather presents great difficulties for an author. Within the limits prescribed (presumably) by Davis, Krumm has done well. This chapter contains much that is of interest and

value to the fire-control man. I think that my main criticism of this chapter is of its basic outlook. It is really necessary that a course in meteorology be a prerequisite to one in fire control. It is simply impossible to give a complete meteorology course in one chapter. My own preference in this matter would be to have the chapter written with the presupposition that the reader did not have to start from scratch. This would allow more space to consider in detail such important matters as local winds and the effects of variations in microclimate on the variables affecting fire behavior.

To return to the main portion of the book, my last major criticism is on Davis' approach to fire danger rating. In considering the development of burning indexes, the basic fact is that the index is an *estimate* of how a fire will burn under a particular combination of fire-behavior variables. Once the objective of the rating system has been determined, it is necessary that the significant fire-behavior variables be isolated, and a selection made of ones that can be integrated usefully into a numerical expression of fire danger. In nearly all burning index ratings in this country, *two* and *only two* variables are used: fuel moisture and wind speed. In these systems, the elements measured and the manner in which they are integrated are all attempts to estimate either the moisture content of the significant fuels, or the wind speed that will affect a fire. Thus, ground-water level, relative humidity and solar radiation, for example, are *not* basic fire-behavior variables, as indicated in the text. They are important only insofar as they affect the basic variable of fuel moisture. Recognition of these facts is fundamental to an understanding of the significance of fire-danger rating systems, their application, and, especially, their limitations; recognition which is lacking in this chapter.

To what extent does the substance of the above criticisms detract from the usefulness of the book as a text or reference book? I do not wish to leave the impression that the book, taken as a whole, is anything but a welcome and needed one in a sadly-neglected field. It will be used in courses of instruction in forest fire control, and it should be. It should also end up on the desks of fire administrators, and they will find much of value in its pages.

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❦ ❦ ❦

Private Forestry in Norway—A Case Study in Small Woodland Management and Forestry

By John A. Zivnuska. 50 pp. Society of American Foresters (Forest Science—Monograph 1). 1959. $1.

The author herein reports an on-the-ground study in 1954-1955 made possible by a Fulbright Grant with assistance from Resources for the Future, Inc. Dr. Zivnuska, associate professor of forestry at the University of California, a well-known forest economist, draws upon extended field observation, the advice and assistance of many Norwegian authorities, and a wide range of literature. Some 35 items are cited—about half in Norwegian. The bulletin, with a distinctive format, inaugurates a new Society of American Foresters publications series.

Norway, the author considers, is well suited to this study. Forests are the dominant form of land use; four-fifths of the forest land is in private—mainly farm—ownership; and forests are of great importance in the national economy. Conditions are homogeneous. Norway has acquired a large body of experience in dealing with private forests.

Wisely omitting the minutiae of silvicultural practices and administrative procedures, the author presents a thorough, objective analysis of silvicultural concepts, economic considerations, and institutional features of Norway's well-rounded program for small forests. He also deals with the main legislative provisions.

Present forest conditions and silvicultural concepts result from centuries of exploitation merging into conscious management in the late 1800's, culminating in the establishment of the Norwegian Forestry Society and professional forestry education in 1898, and the Forest Protection Act of 1932. After a long period of selection cutting and much debate, even-aged management is deemed to be generally desirable. The conversion of the irregular farm forests to even-aged management, still far from complete, involves silvicultural and economic problems which call for high quality professional control.

The working plan is a primary tool in the development of management. The goal, still far from attained, is a written plan for each forest. The Norwegian Forestry Society has pioneered in plan formulation. The present minimum size of 50 acres for plans prepared by the society is likely to increase as advancing wages force mechanization. The plans, and the problems in co-ordinating silvicultural objectives with economic practicability and needed flexibility, are described. The author concludes that while Norway has made substan-

Oregon State List of Forestry Theses

In 1953, Oregon State College published its first list of forestry theses—those for 1900-1952. A supplement in 1957 recorded theses produced during 1953-1955 and earlier ones that had subsequently come to light.

The Society of American Foresters now publishes in the September issue of *Forest Science* the second supplement which includes theses from January 1956 to June 1958 and ones from earlier years that have been discovered.

Reprints of this list are not now available. However, anyone wishing to order reprints at $1.25 per single copy should write the Society of American Foresters, Mills Building, Washington 6, D. C. If the demand is sufficient, reprints will be ordered. If not, then those needing copies of the thesis list may obtain them by purchasing individual copies of the September issue of *Forest Science* at $2.00 per copy.

tial progress, great difficulties will continue in applying silvicultural management to the smaller properties.

Public regulation of private forest land, embodied in the Forest Protection Act of 1932, is a major feature. This, considering that principal reliance in Norway's forest policy is private ownership, is consistent with the relation between government and the private economy as a whole. Emphasis in practice is upon the educational-service approach rather than the police power. Legal provisions, authorities, and administration as related to small properties, are explained.

Timber marketing is through an integrated system of local, district, and national associations which gives the small owners substantial bargaining power. Prices are negotiated by these associations and the purchasers, with the government sitting in with considerable price control authority.

Of particular interest in Norway's comprehensive measures for financing the forestry operation are the unique, well-established, and effective system of forced cultural expenditures through withholding 2 percent of the value of timber sold and repaying it to the landowner after the work is done; and a parallel arrangement for non-cultural investments. Forest credit, insurance against forest fire damage, and limited public subsidies for planting, drainage, and forest roads also are well established.

The vitally important element of technical advice and assistance; general educational activities; and the administration of the Forest Protection Act of 1932—the main legislative basis of the entire program—are handled through a 3-level system of forestry boards and their staffs: at the top the National Forestry Board, then the 17 fylke (county) boards, and finally the local herred (parish) boards. The Norwegian Forestry Society and affiliates, and the Norwegian Forest Owners Association and affiliates, also perform important functions. This complex organization is well described with the aid of a diagram.

This publication is an excellent presentation of Norway's forest policy, program, and organization as they relate to small owners. It is a major contribution and source of ideas to students in other countries concerning the difficult and important problem of applying forestry to small properties. It will be a valuable reference for anyone interested in Norway's forest policy and program.

R. E. MARSH

Water Facts for the Nation's Future

By Walter B. Langbein and William G. Hoyt. 288 pp. The Ronald Press Co., New York. 1959. $5.

". . . never before have there been so many of us and never before has each person demanded so many gallons as his share of the common supply" sets the stage for this very readable, interesting, timely and significant account of water and water problems.

In word and chart a mass of varied information is available to the reader. Examples: the U. S. uses annually over 262 billion gallons of water; since 1955 industry has used more water than agriculture; 30,000 pages of statistical hydrological data are published annually; 39 percent of the reservoirs in the U. S. have a useful life of less than 50 years; evaporation from Lake Mead averages 900,000 acre feet per year or 16% of that available in the reservoir; and the flow of the Mississippi river for 12,600 years would be required to dilute just one year's fission products from nuclear power production.

Although this book contains many such eye-catching items as above it is by no means an encyclopedia of entertaining facts. It is a survey and review of programs for the collection of data relating to water and the use of these data in water development and management.

Publication of the book was sponsored by the Conservation Foundation and it is one of five completed studies dealing with water resources. Foresters will be most familiar with E. A. Colman's *Vegetation and Watershed Management* which appeared in 1953 and which has been used as a text or as supplementary reading in university courses in watershed management and forest influences.

Water Facts for the Nation's Future is divided into two parts. Part I, subheaded, "Gathering Data," describes and comments on current government programs for gathering data relating to stream flow, ground water, chemical quality of water, movement and deposition of sediment, precipitation, snow surveying, reservoir evaporation, total evapotranspiration, meteorological developments in relation to hydrology, water use and flood damages. Other chapters cover the design of a network for collecting hydrologic data, topographic and other mapping programs, problems of organizing agencies for collection of basic data, the publication of hydrologic data and the cost of financing basic data programs. Part I seeks to illuminate how best to go about collecting indispensable factual information and how to get the most from these facts. A short résumé terminates each chapter.

Part II, "Data in Action," discusses how well information now being gathered is applied to meet ever-growing problems of water control and utilization. A lesson learned is that "more and more information is needed to develop less and less water." Chapter subjects indicative of coverage are hydroeconomic decisions, irrigation, flood-control, streamflow forecasting, upstream engineering and land management (here the authors touch on forest management and water yield), town, city and industrial water problems, data for waste-water disposal, managing water projects, troubles and failures, and lastly, better data for

better decisions. The reviewer, probably because of the perversity of human nature found "troubles and failures" especially interesting.

Of the authors, Mr. Langbein has been a hydraulic engineer and hydrologist with the U. S. Geological Survey since 1935; Mr. Hoyt, retired since 1951, has had a long government career as a water resource engineer and hydrologist. Their book is designed for interested laymen, administrators, legislators, water engineers and hydrologists. The authors and the Conservation Foundation are to be complimented for a readable book which should provide many people with an intimate picture of the intricate problems involved in the management of water resources.

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Stars Upstream

By Leonard Hall. 252 pp. Illus. The University of Chicago Press, Chicago. 1958. $3.95.

For something like fifteen years Leonard Hall has written an outdoor column for the *St. Louis Post Dispatch*. It is one of the tops in its field and is read not only by city folks wishing to escape the city but also by country folks. A farm friend of mine once remarked, "Why, that fellow can make feeding the cows sound like a real adventure." And so he can. Furthermore, Hall is well grounded in agriculture, in natural resource conservation, and in the fine art of fishing.

Stars Upstream chronicles a series of canoe float trips that span the 150-mile length of Current River from its origin in the eastern Missouri Ozarks to the Arkansas line. But this is more than an entertaining tale of float fishing. It is a story of a river, its forested watershed, and the people who have used or abused the land. It is in miniature the story of the Ozark Region.

The Ozarks have been made famous by Harold Bell Wright, Bob Burns, and more recently a TV program called Ozark Jamboree whose performers were of diverse geographical origins. The Ozark mountains are not of imposing height, but have the distinction of being geologically the oldest mountains on the continent. Ecologically, the region shows the diversity of plant and animal life that evolved through a long, uninterrupted period of evolution. The glaciers stopped short of the Ozarks. It is a land of wooded hills and spring fed streams, an ancient land with a charm all its own. You acquire a taste for it in somewhat the same manner one learns to like olives.

The original white settlers were hill people from the East, largely of early pioneer English stock. Their mark remains on the culture of the region. The history of land use in the Missouri Ozarks is not a new one for a forested country. The timber industry moved in at the turn of the century. After the cream of the timber crop was cut, it moved out, leaving the small outfits to clean up isolated stands. Inevitably, there followed the usual sequence of events—the attempt to turn forest soils to agriculture or grazing use with fire as a tool, the gradual deterioration of economic values, tax delinquency, uninterested, non-resident ownership of large areas. For a quarter century the Ozarks burned, until in the '30's national forest areas were established by purchase and the state undertook the long-term program of preventing and controlling fires on privately owned lands. Progress is slow but there are signs of returning health to the land.

The country through which Hall has chosen to guide his readers retains today what he calls "the illusion of wilderness." Spring fed Current River twists and turns and rushes down a narrow valley in which there is but little cultivated land. Its rugged watershed is over 80 percent forested. Access roads are few. Fishing is not what it used to be, but there are bass and blue gill and an occasional "Jack Salmon," and the typically Ozark sport of floating down the stream under current-power has deteriorated not one whit in its zestfulness. The gravel bars furnish breeze swept, mosquito free camp sites where the fog settles like a blanket in the small hours of the morning. Hall notes the bird and animal life with the keen eye of a well-informed amateur ornithologist. He introduces his readers to the people of the hill country with the friendliness and understanding of long acquaintance.

Many books have been written about mighty rivers and their significance in our economic and social history. Here is a book about a minor but unique stream which has retained much of its original wilderness character because it flows through a rugged, forested land. Here is a delightfully written account of the pleasures of canoeing, fishing, and camping interwoven into the larger story of how we have treated and mistreated one piece of the surface of the earth.

Those unfortunate persons who have never gazed into a clean, fast running stream on a clear night may not understand the title. It may be well to point out that after a while the water stands still and the stars glide up the stream.

ARTHUR B. MEYER

The Small Independent Firm's Role in the Forest Products Industry

Report of The Select Committee on Small Business. U. S. Senate, Report No. 240, 86th Congress, 1st Session. 110 pp. Government Printing Office, Washington, D. C. May 1959.

The Select Committee on Small Business of the Senate has recently issued a report on the small independent firm's role in the forest products industry. This is the first attempt by this Committee to review the role of small business in the forest products industry. Most

of the interest that Congress has shown in forestry matters has been devoted to policies related to land use and development. This study directs most of its attention to the eastern United States where small firms, those with less than 20 employees, predominate. The 110-page report is in two parts; eight major Committee recommendations are set forth succinctly at the outset and a staff report by Charles H. Stoddard, forestry consultant, follows. The recommendations propose a series of studies, some expansion of federal activity in areas where work is already being done and urges greater efforts on the part of states and small business, itself, in solving problems. The staff study attempts to diagnose and analyze the problems of small units of production in this era of automation and this age of merger and industrial concentration.

The first recommendation of the Committee urges an increase in activity by the Forest Utilization Service of the Forest Service and the Small Business Administration in bringing new technological developments to small firms. Improved credit facilities are suggested to better assure independent producers of freedom from buyer financing. Federal-state cooperation in improved marketing and price reporting facilities is suggested in two recommendations covering these fields. In its fifth recommendation, the Committee endorses legislation before the Congress which would authorize research pilot plants for processing surplus forest and agricultural products. A bill to do this passed the Senate in the 85th Congress and recommendations favoring this proposal were made by the President's Commission on Increased Use of Agricultural and Forest Products. Allegations that pulpwood prices have an abnormal behavior brought a recommendation that this matter be further studied by the Department of Justice and the Federal Trade Commission. Study is urged of the need to develop standard grades for forest products. The eighth recommendation by the Committee really consists of seven separate and distinct suggestions relating to the capital gains provision for timber, gasoline tax on private logging roads, increased emphasis on research, the study of freight rates, and a suggestion that federal lumber purchase specifications be modified. The Committee also urged the wood using industry to continue purchasing wood from part-time farmers and that the Forest Service study what types of forestry measures could be included in a national forestry improvement program.

The report serves a useful purpose in bringing together recent data and sources of information on an important sector of the forest economy; however, the report does not come to grips with the basic problem that affects all segments of small business. Small businessmen continue to be both unorganized and unorganizable. Thus, they do not have an effective means of coping with the more highly organized, larger units of production, both in securing legislation beneficial to them and in finding out about technological improvements that will benefit their operation. Foresters in public employment who deal with both large and small customers and those concerned with the continuing problem of how small land ownerships can make greater contributions to our resource needs will find this report interesting.

The first printing of 3,000 copies was quickly exhausted and the Senate has authorized the printing of an additional 3,000 copies.

ROBERT E. WOLF
Washington, D. C.

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Production of Poplar Timber in Europe and Its Significance and Application in the United States

By Ernst J. Schreiner. U. S. Dept. Agric. Handbook No. 150. 124 pp. Illus. 1959. 45 cents.

The poplar has been grown in Europe since Roman times. About 200 years ago, the American cottonwood was introduced to Europe, bringing hybrid vigor to Old World poplar culture. Then in 1947, the International Poplar Commission was organized under sponsorship of the FAO. Since the end of World War II, the recognition of the importance of the poplar to Europe's forest economy has increased astonishingly.

Ernst J. Schreiner's book is the result of three tours in Europe made by him to study this poplar production and to evaluate its significance to American forestry. In 1951-1952, 1955, and 1957, he traveled extensively by car—over 30,000 miles—throughout western Europe from Spain and Italy north to Norway and Sweden.

The author writes in a clear and simple style. And while this book does not attempt to be a catalog of all aspects of growing poplar timber, it does compare European practices and traditions with our own, and recommends those most worthy of our adoption. No one in America is better qualified to make these comparisons, for as a pioneer in tree breeding, Dr. Schreiner has been working with hybrid poplars since 1924.

The book is divided into 12 chapter-sections, and also contains a five-part appendix. Each chapter treats the several phases of European poplar culture, and then stresses the useful points of each for the poplar grower in the U. S. The report covers history and types of poplars in Europe, selection and breeding, nursery practices, site and soil requirements, outplanting, management and silviculture, growth and yield, and wood characteristics. It also includes sections on the diseases, insects, and other damaging agents.

Identification and naming of poplars is taken up in the appendix. And because of the confusing

state of poplar names in some parts of Europe, the author asserts that this country should adopt a national registration of clones to protect the grower.

Hybrid poplars are important in Europe today because of the shortage of wood and because of the rapid growth of the poplar under proper culture. Dr. Schreiner makes no prediction of the cost and returns of poplar in this country, for as he says, European figures cannot be accurately converted to American conditions. However, he states that our returns will depend largely on the extent to which poplar production can be successfully mechanized, and also on the existence of reliable markets.

Yet the rapid growth and high productivity of hybrid poplars on suitable sites makes them seem attractively profitable, especially for the farmer. The best management of poplars requires some cultivation and pruning and such work falls easily within the farmer's off-season. Then too, much cultivation can be carried out with available farm machinery.

In Europe, many farmers harvest their poplars in 12 to 25 years. Under the most favorable conditions, especially in northern Italy, hybrid poplars are the landowner's most profitable crop.

Dr. Schreiner found that for the production of poplar planting stock those nursery practices used in Europe are applicable to poplar culture in this country.

While our production of hybrid poplars is still in the experimental stage, hybrids can meet many of the requirements of industries that are now using other and less rapid-growing native species. And European tradition and research can supply answers to most of our poplar problems.

WENDELL E. SMITH
Northeastern Forest Experiment Station

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Hydrology for Engineers

By Ray K. Linsley, Jr., Max A. Kohler, and Joseph H. Paulhus. 340 pp. Illus. McGraw-Hill, New York. 1958. $8.

Those who are familiar with *Applied Hydrology* (1949) by the same authors will welcome this revised and up-to-date version. This book is designed specially as an elementary text for engineering students. Its intent is to impart an understanding of hydrologic theory and practice in the simplest possible terms, and it therefore gives concise and clear explanations of the latest techniques. Following the excellent introductory chapters on the history and meaning of hydrology and on the basic concepts in weather and hydrology each of the 11 subsequent chapters discusses a separate aspect in terms of principles, methods of measurement, and interpretation. In each case the limitations of theory and measurement — including instruments—are clearly set down, because the authors recognize that "The natural phenomena with which hydrology is concerned do not lend themselves to rigorous analyses such as are possible in engineering mechanics. There is, therefore, a greater variety of methods, more latitude for judgment and a seeming lack of accuracy in problem solutions" (p. vii). The authors also freely acknowledge the contributions of various sciences and professions, including forestry, to the developments in the science of hydrology. "Indeed, the engineer owes much of his present knowledge of hydrology to agriculturists, foresters, meteorologists, geologists, and others in a variety of fields" (p. 1). The literature citations and bibliographies provide additional evidence of this debt.

Since the book is designed for classroom instruction it does not go into as much detail as the practitioner might desire. Techniques are described only in outline and in a number of instances the non-hydrologist reader would need to consult the references cited or otherwise obtain the requisite background information in order to understand their application or interpret the measurements with confidence. Much of the text applies directly to the measurement and interpretation of conditions and practices such as the watershed-oriented forester or range manager would commonly want to assess. Thus the chapter on "Groundwater" includes soil-water relationships, their measurements and significance in the overall groundwater picture and their relation to evapotranspiration (discussed in another chapter). The chapter on "Runoff Relations" takes up infiltration, snowmelt and the role of vegetation. The chapter on "Hydrographs of Runoff" is an excellent critique of the principles and methods involved in estimating peak discharges from inadequate streamflow information. An appendix on graphical correlation is included because the authors recognize that the empirical nature of hydrology requires a considerable degree of correction analysis. Another appendix presents physical constants, conversion tables and equivalents.

This book by itself is not sufficient to meet the range of requirements of the practicing watershed manager for technical knowledge, even in the field of hydrology *per se*. Such other works as *Forest Influences* (Kittredge, 1948) and texts on soil and water conservation engineering, forest soils and ecology are also essential, to assure rounded understanding. But within its limitations *Hydrology for Engineers* highly deserves to be included among the basic teaching aids in watershed management courses for foresters.

BERNARD FRANK
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Current Literature

Compiled by MARTHA MEELIG, *Librarian, State University College of Forestry at Syracuse University*
Range Management Section Compiled by NELLIE G. LARSON, *Library, U. S. Department of Agriculture*

General

A Compilation of the Edible Wild Plants of West Virginia. By W. H. Gillespie. 134 pp. Illus. Scholar's Library, New York. 1959. $2.50.

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Society Affairs

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Annual Meeting

Society of American Foresters

San Francisco, California, November 15-19, 1959

With a possible total registered attendance of 1200 members, their ladies, and guests, the 59th annual SAF meeting will be held in San Francisco, November 15-18. The theme of the meeting is "Forestry and People."

Headquarters for the meeting will be the Sheraton-Palace Hotel. It will be the scene of the opening general session, the Society Affairs session, nine subject Division meetings, and the Society's annual reception and dinner.

President George A. Garratt will formally open the meeting at 9:30 a.m., on Monday, November 16. Samuel H. Bryan, chairman of the Northern California Section, will serve as chairman of this opening general session.

Schedule of Events

Sunday, November 15

SAF Council meeting; morning and afternoon.

Editorial Board, JOURNAL OF FORESTRY; afternoon.

Association of Consulting Foresters open meeting; evening.

Forest Tree Improvement Committee meeting; evening.

SAF Council and Section delegates joint meeting; evening.

Monday, November 16

General session; morning.

Society Affairs session; afternoon.

Alumni functions (no scheduled SAF meetings); evening.

Tuesday, November 17

Division of Silviculture meeting; morning and afternoon.

Division of Forest Products meeting; morning.

Division of Economics and Policy meeting; afternoon.

Division of Forest Recreation meeting; morning.

Division of Wildlife Management meeting; afternoon.

Ladies' tour to Monterey; all day.

Alumni and social functions (no scheduled SAF meetings); evening.

Wednesday, November 18

Division of Forest Management meeting; morning and afternoon.

Division of Education meeting; morning.

Division of Range Management meeting; morning.

Division of Watershed Management meeting; afternoon.

Reception and dinner; evening.

Thursday, November 19

Field trip to Santa Cruz Mountains; all day.

Preconvention Meetings

November 13. Evening meeting of foresters representing schools of forestry at land-grant colleges and universities, Sheraton-Palace Hotel.

November 13 and 14. A meeting at the Institute of Forest Genetics, Placerville, Calif. of the SAF Tree Im-

The Council's Column appears on page 643

GEORGE A. GARRATT

provement Committee and the Western Forest Genetics Association. Program on page 684.

November 14. Closed meeting of the Council of Forestry School Executives, School of Forestry, University of California, Berkeley, Calif.

The Field Trip

Following the theme of the general meeting the 1959 field trip is organized around the theme of "California Forestry and People in Miniature," and is designed to give a one-day look at some of the state's forest practices, interesting forest types, and a changing pattern of forestry brought on by increasing population.

The trip, for men only, will be on Thursday, November 19, and will be to the Santa Cruz area 70 miles south of San Francisco. Here the group will visit one of the highly interesting forest areas in the West because of its great variety of tree species, vegetative types, topography soils, climate, and forest use patterns.

Santa Cruz is the heart of the southern redwood belt with notable stands of old- and young-growth redwood and Douglas-fir. There will be opportunity to observe the ecology and silviculture of this forest type.

Plans include visits to the Big Basin State Park which is a grove of virgin redwood dedicated to recreational use, to young stands for a look at the remarkable growth potential of this species, to a state forest nursery, and to an old-growth redwood logging operation to see how the "big ones" are handled.

Also planned is a glimpse of Monterey pine in its native habitat, a discussion of the hardwood and brush types and their protection and use problems. Recreational use of this forest area with its relatively dense population in combination or in conflict with commercial utilization of the timber will be a recurring point of discussion throughout the trip.

Travel will be by chartered bus with a "host" from the Northern California Section in each to answer questions and provide background and continuity to the program. Because several buses will be used and the route includes some fairly difficult driving conditions, no private passenger cars will be permitted. Plans are to leave the Sheraton-Palace Hotel at 8 a.m. and return by 6 p.m. Lunch will be provided in the field. Total cost including lunch and transportation is estimated at $5.

Those desiring to take part will be asked to register in advance. Tickets may be obtained at the general registration desk.

Program for Ladies

Sunday, November 15

Registration—12:30-8:30 p.m.

Afternoon Coffee—3:00-5:00 p.m., Ladies Lounge, Sheraton-Palace Hotel.

Monday, November 16

Continental Breakfast — 9:00 a.m., Ladies Lounge, Sheraton-Palace Hotel.

The ladies are invited to be guests at this affair and it is urged that all in attendance at the meeting be present. Registration will be completed and the plans for entertainment and for the enjoyment of a San Francisco visit will be presented.

Afternoon: Free for sightseeing and shopping.

Tuesday, November 17

Monterey Peninsula Tour—Leave Southern Pacific Station, Third and Townsend Streets, San Francisco 8:17 a.m.

Return 7:00 p.m.

This all-day tour will offer a ride through an interesting part of California on a luxury train carrying a snack car and lounge cars.

At Monterey transfer will be made to busses for a trip around the historic and beautiful Monterey peninsula. Stops of unusual interest will be made at historic homes, Del Monte Lodge and Pebble Beach, Carmel for shopping and lunch and at the Mission San Carlos Borromeo de Carmelo. The California ladies who have planned this trip are sure that it, too, will be a most memorable and exciting experience.

WILLIAM D. HAGENSTEIN

Wednesday, November 18

Morning: A no-expense tour of an area of San Francisco which will enchant every lady. The details and description of this tour will be given at the breakfast on Monday morning, November 16.

Afternoon: Free for matinees, sightseeing, or shopping.

Evening: SAF annual dinner at the Sheraton-Palace Hotel.

Thursday, November 19

Morning: Bus tour to Muir Woods. This will be an optional tour for those who wish to see the magnificent coast redwoods. The field trip of the Society will not be available to the ladies.

Afternoon: Free for sightseeing or shopping.

General Meeting

Monday morning, November 16
Theme: Forestry and People

Samuel H. Bryan, Chairman

1. Welcome by the President, George A. Garratt.

2. "The Impact of Population on Forest Management." Charles A. Connaughton, California Region, U. S. Forest Service, San Francisco, Calif.

3. "Industry Responsibilities and Vulnerability to Population Growth." Clarence W. Richen, Northwest Timber Department, Crown Zellerbach Corporation, Portland, Ore.

4. "Twenty Years of Population and Forestry Advances." Henry J.

Vaux, School of Forestry, University of California, Berkeley, Calif.

Society Affairs Session

Monday afternoon, November 16

George A. Garratt, President
Henry J. Malsberger, Vice President
Henry Clepper, Executive Secretary

1. Report of the President.
2. Report of the Executive Secretary.
3. Report of the Editor of Society publications, Arthur B. Meyer.
4. Report of the Editor of *Forest Science*, Stephen S. Spurr.
5. Report of the Committee on International Relations, V. L. Harper.
6. Progress Report on the Study of Education in Forestry and Related Fields of Natural Resources Management, Samuel T. Dana, Director.
7. Report of the Committee for the Advancement of Forestry Education, Frank H. Kaufert, Chairman.

Panel Discussion

State Registration and Licensure of Foresters

Henry J. Malsberger, Moderator

1. "Basic Principles Involved in Registration and Licensing of Foresters." Terrill D. Stevens, Department of Forestry, Michigan State University, East Lansing, Mich.
2. "Needs Involved in Registration and Licensing of Foresters." Wilbur B. DeVall, Department of Forestry, Alabama Polytechnic Institute, Auburn, Ala.
3. "Experiences Involved in Registration and Licensing of Foresters." Archie E. Patterson, School of Forestry, University of Georgia, Athens, Ga.
4. Open discussion.

Division of Silviculture

Tuesday morning, November 17

William H. Cummings, Chairman
Jesse H. Buell, Vice Chairman
Gilbert H. Schubert, Secretary

1. "Tropical Silviculture." I. T. Haig, U. S. Forest Service, Washington, D. C.
2. "Prescribed Burning in Loblolly Pine Management." Thomas Lotti, Southeastern Forest Experiment Station, Charleston, S. C.
3. "Vegetational Development Following Burning in the Boreal Forest of Minnesota." Clifford E. Ahlgren, Quetico-Superior Wilderness Research Center, Ely, Minn.
4. "Fire Environment and Silvicultural Practice." Clive M. Countryman, Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.
5. Report of the SAF Committee on Natural Areas. John F. Shanklin, Technical Review Staff, U. S. Department of the Interior, Washington, D. C.
6. Report of the SAF Committee on Forest Tree Improvement. R. T. Bingham, Intermountain Forest and Range Experiment Station, Moscow, Idaho.

Tuesday afternoon, November 17

1. "Problems of Pine Seed Supply in the Southeast." P. E. Hoekstra, Southeastern Forest Experiment Station, Lake City, Fla.
2. "Selecting the Proper Seed Source of Ponderosa Pine." Robert Z. Callaham, Intermountain Forest and Range Experiment Station, Spokane, Wash.
3. "Partial Cuttings in Mature Stands of the Western White Pine Type." Charles A. Wellner, Intermountain Forest and Range Experiment Station, and Raymond J. Boyd, U. S. Forest Service, Ogden, Utah.
4. "Photosynthetic Limits of Forest Type Yields." Henry Helmers, Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif., and James Bonner, California Institute of Technology, Pasadena, Calif.
5. "Nutrition of Forest Trees." H. A. Fowells, U. S. Forest Service, Washington, D. C.

Division of Forest Recreation

Tuesday morning, November 17

Frank W. Childs, Chairman
William A. Parr, Vice Chairman
Henry A. Harrison, Secretary

1. Business meeting.
2. Address of welcome. Newton B. Drury, 822 Mendocino Avenue, Berkeley, Calif.
3. Panel Discussion: "Recreation Across the Nation."

The Western States. Lawrence C. Merriam, National Park Service, San Francisco, Calif.

The Central States. M. M. Nelson, U. S. Forest Service, Milwaukee, Wis.

The Eastern States. Charles H. Stoddard, Resources for the Future, Inc., Washington, D. C.

Questions and review.

4. "Problems in Recreational Research." Richard D. Lane, U. S. Forest Service, Upper Darby, Pa.
5. Progress Report on the 1960 Olympics at Squaw Valley. W. S. Davis.
6. Suggestions for 1960 meeting of Division of Forest Recreation.

Division of Forest Products

Tuesday morning, November 17

Bernard M. Granum, Chairman
Rudolph F. Grah, Vice Chairman
Harvey D. Erickson, Secretary

1. "Wood at its Apogee?" Fred E. Dickinson, Director, Univ. of California Forest Products Laboratory, Richmond, Calif.
2. "Utilization from Forest to Finished Product." Richard D. Roseberry, Diamond-Gardner Corporation, Chico, Calif.
3. Panel Discussion: "Log Grading and Utilization." Charles R. Lockard, U. S. Forest Service, Washington, D. C.
4. "Redwood." Nick Poletika, Union Lumber Company, Fort Bragg, Calif.
5. Division Business Session.

Division of Forest Economics and Policy

Tuesday afternoon, November 17

John A. Zivnuska, Chairman
H. R. Josephson, Vice Chairman
James G. Yoho, Secretary

Panel Discussion: "Public Timber Sale Policies and Economic Development in the Western United States."

1. "The Public Timber Resource of the West." John A. Zivnuska, School of Forestry, University of California, Berkeley, Calif.
2. "The Economics of Public Timber Sale Programs." Ira J. Mason. U. S. Forest Service, Washington, D. C.
3. "The Impact of Public Timber Sale Programs on the Western Forest Industries." George A. Craig, Western Lumber Manufacturers, Inc., San Francisco, Calif.
4. "Public Timber and Small Business." Charles H. Stoddard, Resources for the Future, Inc., Washington, D.C.
5. "Public Timber and the Diversified Forest Products Operation." A. C. Shaw, Champion Paper and Fibre Company, Hamilton, Ohio.
6. "Public Policy and Economic Development." Walter J. Mead, Department of Social Sciences, University of California, Santa Barbara, Calif.
7. Discussion.
8. Business session and election of officers.

Division of Forest-Wildlife Management

Tuesday afternoon, November 17

Lansing H. Parker, Chairman
James B. Gilligan, Vice Chairman
Howard A. Miller, Secretary

1. "The Long-Range Wildlife Man-

agement Program of the U. S. Forest Service." Lloyd Swift, U. S. Forest Service, Washington, D. C.

2. "The Problems in the Use of Systemic Rodenticides." Nelson Kverno, U. S. Fish and Wildlife Service, Olympia, Wash.

3. "Use of Radioactive Scandium 46 to Determine Seed Losses by Animals." William Lawrence and J. H. Rediske, Weyerhaeuser Forestry Research Center, Centralia, Wash.

4. "Deer Range Improvement and Prescribed Burning in Ponderosa Pine." Harold H. Biswell, School of Forestry, University of California, Berkeley, Calif.

5. "The Effects of Current West Coast Logging Practices upon Fisheries Resources." Willis Evans, Calfornia Department of Fish and Game, Sacramento, Calif.

6. Business meeting.

Division of Forest Management

Wednesday morning, November 18

Russell K. LeBarron, Chairman
Thomas B. Glazebrook, Vice Chairman
Frank D. Irving, Jr., Secretary
Donald W. Lynch, Program Chairman

Symposium: "Predicting Forest Growth and Calculating Allowable Cut"

Kenneth P. Davis, Moderator

1. "The Problem of Determining Optimum Levels of Growing Stock for Managed Stands." George R. Staebler, Weyerhaeuser Timber Company, Centralia, Wash.

2. "Rotations for Managed Forests." Lawrence S. Gross, U. S. Forest Service, Washington, D. C.

3. "Quantification and Estimation in Future Forest Management." Lewis R. Grosenbaugh, Southern Forest Experiment Station, New Orleans, La.

4. "Calculating Allowable Cuts in Northern Rocky Mountain Forests." John R. Castles, U. S. Forest Service, Missoula, Mont.

5. "Growth and the Allowable Annual Cut." John F. Bell, Oregon State Board of Forestry, Salem, Ore.

6. "Regulated Forest Management —Southern Style." B. E. Allen, Union Bag-Camp Paper Corporation, Savannah, Ga.

Wednesday afternoon, November 18

Donald W. Lynch, Session Chairman

1. Report of Nominating Committee and election of officers for 1960.

2. "Measuring the People Threat to Forest Managers." Craig Chandler, U. S. Forest Service, Glendora, Calif.

3. "Intermountain System of Fire Danger Rating." Charles E. Hardy and A. F. Brackebusch, U. S. Forest Service, Missoula, Mont.

4. "Fighting Forest Fires from the Air." Clinton B. Phillips, California Division of Forestry, in cooperation with Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.

5. "Effects of Growing Space on Wood Specific Gravity in Loblolly Pine." Robert M. Echols, Southern Forest Experiment Station. Gulfport, Miss.

6. "A Test of Continuous Inventory for National Forest Management Based Upon Aerial Photographs, Double Sampling, and Remeasured Plots." C. Allen Bickford, Northeastern Forest Experiment Station, Upper Darby, Pa.

7. "Estimating Timber on Small Tracts by Direct Photogrammetric Methods." Karl E. Moessner, Intermountain Forest and Range Experiment Station, Ogden, Utah.

Division of Education

Wednesday morning, November 18

Peter W. Fletcher, Chairman
William C. Bramble, Vice-Chairman
John Carow, Secretary

Panel discussion: "Identifying and guiding future forest researchers."

1. Undergraduate preparation for:

"Research in tree physiology." Robert E. McDermott, School of Forestry, University of Missouri, Columbia, Mo.

"Research in wood technology." William T. Nearn, School of Forestry, The Pennsylvania State University, University Park, Pa.

2. Graduate preparation for:

"Research in forest genetics." Scott S. Pauley, School of Forestry, University of Minnesota, St. Paul, Minn.

"Research in forest economics." John A. Zivnuska, School of Forestry, University of California, Berkeley, Calif.

3. On the job training for:

"Industrial research." Royce Cornelius, Weyerhaeuser Timber Company, Longview, Wash.

"Governmental research."

4. Open discussion.

5. Business meeting.

"Safety creed and safety code." Seth Jackson, Chairman, Committee on Safety, SAF, Washington, D. C.

Election of officers.

Division of Range Management

Wednesday morning, November 18

Joe A. Wagner, Chairman
R. M. De Nio, Vice Chairman
Lowell K. Halls, Secretary

1. "Compatability of Forage and Timber Production on Ponderosa Pine Lands." Avon Denham, U. S. Forest Service, Portland, Ore.

2. "Roll of Grass Seeding in the Rehabilitation of Disturbed Areas Following Logging and Fire." James E. Sowder, Lake States Forest Experiment Station, Saint Paul, Minn.

3. "Impacts of Competitive Land Uses on the Production of Adequate Timber Supplies from Private Lands." Paul E. Shively, Fibreboard Products Inc., San Francisco, Calif.

4. "Improving Cover on California Rangelands to Meet Increasing Demands for Wildlife and Livestock Forage." E. J. Woolfolk, Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.

5. "California Brushlands: Their Characteristics and Utilization." Arthur W. Sampson, School of Forestry, University of California, Berkeley, Calif.

6. "Rehabilitation of California Watersheds Following Wildfire Burns." L. T. Burcham and James B. Davis, California State Division of Forestry, Sacramento, Calif.

Division of Watershed Management

Wednesday afternoon, November 18

Sidney Weitzman, Chairman
Jack S. Rothacher, Vice Chairman
Paul J. Zinke, Secretary

Charles A. Connaughton, Moderator

1. "The National Water Situation —Today and in the Future." E. L. Henricks, Geological Survey, U. S. Department of the Interior, Washington, D. C.

2. "State and Local Activities to Meet Growing Water Needs." Harvey O. Banks, California Department of Water Resources, Sacramento, Calif.

3. "The Role of Public Forest Land in Watershed Management." J. K. Vessey, U. S. Forest Service, Atlanta, Ga.

4. "The Role of Private Forest Land in Watershed Management." Carl J. Johnson, Interstate Commission on the Potomac River Basin, Washington, D. C.

5. "Forest Watershed Research— Its Accomplishments and Opportunities." Marvin Hoover, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.

6. Discussion period.

7. Business session.

The Society Dinner

Wednesday evening, November 18

William D. Hagenstein, Toastmaster

SOCIETY OF AMERICAN FORESTERS

1959 Annual Meeting

San Francisco, California. November 15, 16, 17, and 18

Housing Committee, Society of American Foresters,
Room 300, 61 Grove Street,
San Francisco 2, California.

First choice hotel _____

Second choice hotel _____

Third choice hotel _____

Please make a reservation for the following room accommodations for arrival on November———, a.m. p.m. Departure———, a.m. p.m.

I understand that accommodations will be provided at the daily rate specified, if available; otherwise the nearest rate available will apply.

——— Single room with bath. Rate $———.

——— Double-bed room with bath. Rate $———.

——— Twin-bed room with bath. Rate $———.

——— Suite (parlor, twin-bed room, and bath). Rate $———.

——— Other. (Specify accommodations desired.) Rate $———.

The above accommodations are requested for the following persons in addition to myself. (Please print or typewrite names and addresses legibly.)

_____

_____

_____

My name: _____

Street address: _____

City, zone, state: _____

Enclosed is a deposit in the amount of $———.

Important Notice: Members submitting requests for hotel reservations are asked to indicate below if their wives will wish to go on the all-day tour for ladies to Monterey on Tuesday, November 17.

☐ My wife wishes to go on the ladies' tour.

1. Presentation of the Society of American Foresters award for achievement in biological research, by President George A. Garratt.
2. "Our Western Frontier." James H. Shoemaker, Vice President, Bank of Hawaii.
3. Entertainment with a Spanish-American theme.

Hotel Reservations

Those planning to attend the meeting are advised to arrive in San Francisco on Sunday, November 15, or not later than 9 a.m., Monday, November 16. The first general session will start at 9:30 a.m., Monday, in the Sheraton-Palace Hotel.

The Sheraton-Palace, on Market Street at New Montgomery Street, will be the headquarters for the meeting. The zone number is San Francisco 19.

This hotel has 700 rooms, but it will not be able to accommodate all those in attendance. Hence, other cooperating hotels are making space available.

All requests for room reservations should be sent to the Society of American Foresters Housing Committee, Room 300, 61 Grove Street, San Francisco 2, Calif. All reservations will be confirmed if the requests are received not later than October 31.

For each room reserved, there should be an accompanying deposit of $10. Checks should be made payable to SAF Housing Bureau.

Reservations will be accepted and confirmed in the order of their receipt. Assignment of rooms will be made at, or as near, the desired rate as possible. Early reservation requests are desirable.

The accompanying reservation coupon may be used. Readers who do not want to cut the coupon from their JOURNALS may request reservations by letter, provided all the information listed on the coupon is given.

Cancellations must be received 15 days prior to the meeting for refunds of deposits to be made by the hotel. If sufficient time is not allowed for the hotel to reassign space, the deposit is forfeited.

Hotels and Rates

All rates quoted are with bath; these are daily rates.

Sheraton-Palace Hotel, Market Street at New Montgomery Street; 700 rooms; adjacent garage. Single occupancy: $11 to $21. Double-bed rooms: $15 to $25. Twin-bed rooms: $15 to $25. Parlor suites: $28 up.

Bellevue Hotel, 505 Geary Street,

at Taylor; 250 rooms; garage attached. Four blocks from Sheraton-Palace. Single occupancy: $7.50 to $10. Double-bed rooms: $9.50 to $12.50. Twin-bed rooms: $11 to $15.

Beverly-Plaza Hotel, 342 Grant Avenue, at Bush Street; 200 rooms. Six blocks from Sheraton-Palace. Single occupancy: $7 to $9. Double-bed rooms: $9 to $11. Twin-bed rooms: $10 to $12.

Californian Hotel, 405 Taylor Street at O'Farrell Street; 300 rooms; garage next door. Six blocks from Sheraton-Palace. Single occupancy: $9 to $11. Double-bed rooms: $11 to $13. Twin-bed rooms: $11 to $14.

Chancellor Hotel, 433 Powell Street; 150 rooms; garage service. Six blocks from Sheraton-Palace. Single occupancy: $7. Double-bed rooms: $9. Twin-bed rooms: $10.

Clift Hotel, Geary at Taylor Street; 400 rooms. Six blocks from Sheraton-Palace. Single occupancy: $13 to $21. Double-bed rooms: $15 to $17. Twin-bed rooms: $16 to $23.

Drake Wiltshire Hotel, 340 Stockton Street; 250 rooms; garage available. Four blocks from Sheraton-Palace. Single occupancy: $10 to $11. Double-bed rooms: $12 to $14. Twin-bed rooms: $15 to $16.

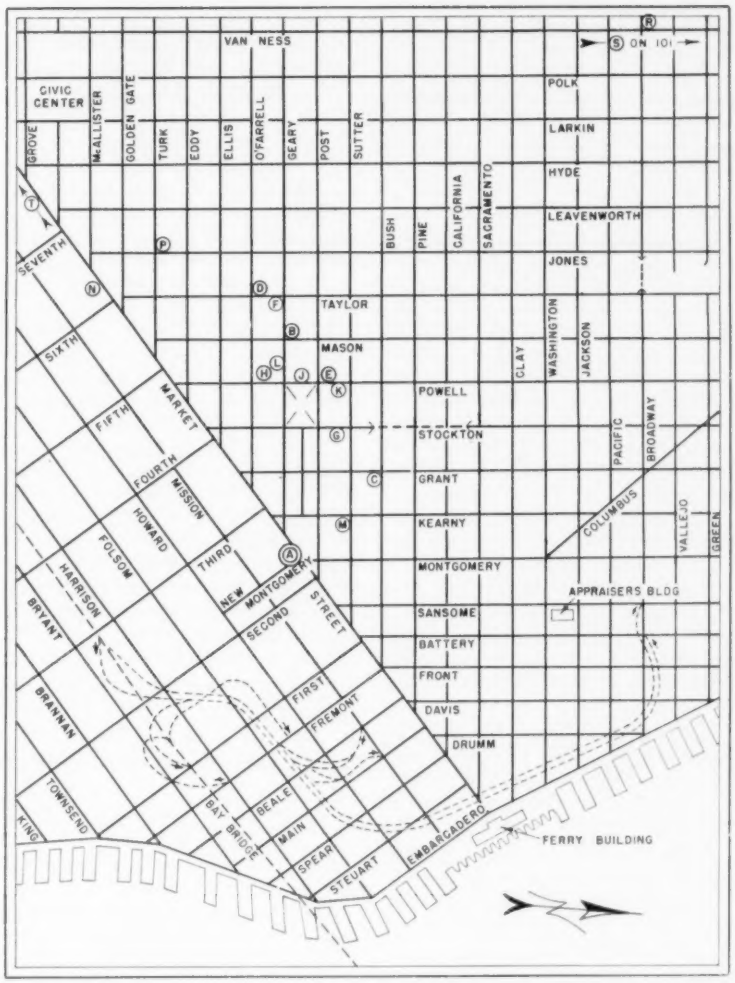
Manx Hotel, 225 Powell Street; 300 rooms; garage service. Four blocks from Sheraton-Palace. Single occupancy: $6 to $9. Double-bed rooms: $9 to $11. Twin-bed rooms: $10 to $12. Parlor suites: $15 and $20.

St. Francis Hotel, Powell and Geary Streets (Union Square); 1,000 rooms. Four blocks from Sheraton-Palace. Parking in Union Square garage. Single occupancy: $11 to $22. Double-bed rooms: $13 to $20. Twin-bed rooms: $16 to $25. Parlor suites: $30 to $50.

Sir Francis Drake Hotel, 450 Powell Street, at Sutter; 600 rooms; basement garage. Six blocks from Sheraton-Palace. Single occupancy: $10.50 to $15.50. Double-bed rooms: $12.50 to $17.50. Twin-bed rooms: $15.50 to $20.50. Suites: $34 up.

Stewart Hotel, 351 Geary Street, at Union Square; 400 rooms, garage service. Four blocks from Sheraton-Palace. Single occupancy: $7 to $10. Double-bed rooms: $8 to $10. Twin-bed rooms: $10 to $18.

Sutter Hotel, 191 Sutter Street; 200 rooms. Two blocks from Sheraton-Palace. Single occupancy: $5 to $7. Double-bed rooms: $7 to $9. Twin-bed rooms: $8 to $10.



MAP OF DOWNTOWN San Francisco showing the relative location of hotels that are cooperating with the SAF Housing Committee for the 1959 annual meeting.

Hotels

A. Sheraton-Palace Hotel.
B. Bellevue Hotel.
C. Beverly Plaza Hotel.
D. Californian Hotel.
E. Chancellor Hotel.
F. Clift Hotel.
G. Drake Wiltshire Hotel.
H. Manx Hotel.
J. St. Francis Hotel.
K. Sir Francis Drake Hotel.
L. Stewart Hotel.
M. Sutter Hotel.
N. Whitcomb Hotel.
P. YMCA

Motels

R. Broadway Manor Motel.
S. Lombard Plaza Motel.
T. Market Street Travelodge.

Whitcomb Motor Hotel, 1231 Market Street, at 8th; 500 rooms; ample parking. Seven blocks from Sheraton-Palace. Single occupancy: $7 to $12. Double-bed rooms: $9 to $16. Twin-bed rooms: $10 to $16.

YMCA, 351 Turk Street. Seven blocks from Sheraton-Palace. Single occupancy: $4.25 to $5.50. Double-bed rooms: $5.25 to $6. Twin-bed rooms: $7.

Motels and Rates

San Francisco has 30 motels. A list of them with their addresses and daily rates may be obtained on application to the Convention and Visitors Bureau, 300 Civic Auditorium, 61 Grove Street, San Francisco 2, Calif.

In requesting a motel reservation, payment equal to the daily rate but in no case less than $8 should accompany the reservation. Checks should be made payable to SAF Housing Committee.

The following motels will make rooms available if reservations are made at least 15 days in advance:

Broadway Manor Motel, 2201 Van Ness Street at Broadway. About 30 blocks from Sheraton-Palace. Single occupancy: $8 to $12. Double-bed rooms: $10 to $12. Twin-bed rooms: $12 to $14.

Lombard Plaza Motel, 2026 Lombard Street; U. S. Route 101. Two miles from Sheraton-Palace. Single occupancy: $6 to $8. Double-bed rooms: $8 to $10. Twin-bed rooms: $9 to $12.

Market Street Travelodge, 1707 Market Street. Fourteen blocks from Sheraton-Palace. Single occupancy: $8 to $10. Double-rooms: $9 to $12. Twin-bed rooms: $11 to $14.

Committees for the Meeting

General Chairman, John Callaghan, 1307 Teneighth Way, Sacramento, 18, Calif.

Program Committee, Keith Arnold, chairman, Pacific Southwest Forest and Range Experiment Station, P. O. Box 245, Berkeley 1, Calif.; John R. Dilworth, Edwin F. Heacox, James K. Mace, Knox Marshall.

Committee on Local Arrangements, B. H. Payne, chairman, T. H. Harris, vice chairman, U. S. Forest Service, 630 Sansome Street, San Francisco 11, Calif.

Mrs. DeWitt Nelson, Ladies Activities.

Clyde Walker, Information and Publicity.

George A. Craig, Exhibits.

Robert Colwell, Meeting Rooms.

Rudolph F. Grah, Field Trip.

Grant A. Morse, Housing and Registration.

William R. Schofield, Entertainment.

Meeting of SAF Tree Improvement Committee and Western Forest Genetics Association

at Institute of Forest Genetics
Placerville, Calif.
Friday, November 13
F. I. Righter, Tour Leader
Conducted tour of Institute of Forest Genetics and field trip to grounds, arboretum, nursery, and outplantings.
Saturday, November 14

R. T. Bingham, Program Chairman.

1. "Geographic Variation in Ponderosa Pine Seedling Physiology." Robert Z. Callaham, Intermountain Forest and Range Experiment Station, Spokane, Wash.

2. "Variations in Crown-Form Attributes in Populations of Douglas-fir." Robert K. Campbell, College of Forestry, University of Washington, Seattle, Wash.

3. "Provenance Study of Douglas-fir in the Pacific Northwest Region (Nursery Performance)." Kim K. Ching and Dale N. Bever, Oregon Forest Lands Research Center, Corvallis, Ore.

4. "Effect of Elevation and Climatic Factors on Production and Dispersal of Coniferous Tree Pollen." Lorne F. Ebell, Forestry Branch, Canadian Department of Northern Affairs and Natural Resources, Victoria, B. C., and Ralph L. Schmidt, British Columbia Forest Service, Victoria, B. C.

5. "Some Thoughts on Seed Orchards and Their Establishment." Bent Gerdes, Firseed, Inc., Eugene, Ore.

6. "A Douglas-fir Seed Orchard: First Year Results." Thomas E. Greathouse and Virgil Allen, U. S. Forest Service, Portland, Ore.

7. "Timing of Pollen Application in Relation to Viable Seed Yield in *Pinus strobus*." Howard B. Kriebel, Ohio Agricultural Experiment Station, Wooster, Ohio.

8. "Kinds of Racial Variation and Their Significance." Thomas O. Perry, California Institute of Technology, Pasadena, Calif.

9. "Heritability of Juvenile Growth Rate in Western White Pine." A. E. Squillace and R. T. Bingham, Southeastern Forest Experiment Station, Lake City, Fla.

10. "Natural Variation of *Populus tremuloides* and *P. dentata* in Northern Lower Michigan." Burton V. Barnes, Northern Idaho Forest Genetics Center, Moscow, Idaho.

Last Call for Council Nominations

All members are hereby notified that the regular biennial election will be held December 5, 1959. A president, vice president, and nine other members of the Council will be elected for the two-year term 1960-1961.

The present Council is listed on page 678. Any or all of these incumbents may be renominated, provided they accept the nomination in writing.

Membership on the Council is restricted by the Constitution to Members (formerly Senior Members) and Fellows. Any Member or Fellow is eligible to hold office who is in good standing and who accepts the nomination in writing and declares his willingness to serve if elected.

Each voter will have an opportunity to ballot on all candidates for office. Council members are elected in accordance with the system of proportional representation. The procedure of proportional representation will be explained in a later issue of the JOURNAL. It is the system by which the Society has been electing Council members for more than two decades.

Table 1, page 136 February issue, shows distribution of Council members by states 1944-1959.

Candidates for the office of president are voted on separately; the candidate who receives the highest vote is declared elected president, and the candidate who receives the next highest vote is declared elected vice president. Thus all candidates for president are considered as nominated also for vice president.

How Nominations Are Made

The Constitution (Article VIII, Section 2) states the conditions under

which nominations are made by petition.

1. Each petition shall name but one candidate.

2. All candidates must be eligible to hold elective office.

3. A petition shall bear the signatures of at least ten voting members who at the time of signing the petition are eligible to vote in the coming election. (Eligible voting members are Junior Members, Members, and Fellows in good standing.)

4. A voting member may not sign more than one nominating petition for president or more than one nominating petition for a member of the Council. That is, he may sign two, but no more.

5. Petitions must be in the Society office by September 19, 1959.

The Society has no special form for submitting nominating petitions. They may be written as follows:

We, the undersigned voting members of the Society of American Foresters, hereby nominate John Doe, a Member (or Fellow) for the office of president (or member of the Council) for the two-year term 1960-1961.

No nomination will be considered valid unless supported by the nominee's acceptance in writing.

The form of acceptance of a nomination may read as follows:

"I accept the nomination to the office of President (or to membership on the Council) of the Society of American Foresters for the two-year term 1960-1961, and agree to serve if elected."

All nominating petitions should be sent promptly to the Society office, 425 Mills Building, Washington 6, D. C. The executive secretary will gladly provide information about nominating or election procedure.

According to the Constitution (Article VIII, Section 1) a Nominating Committee has been appointed by President Garratt. The Committee is composed of the following members:

Chairman, Harry Wm. Dengler, Extension Service, University of Maryland, College Park, Md.

Earl J. Adams, 4705 Tenth Avenue South, Minneapolis 7, Minn. (State Division of Forestry.)

Robert R. Milodragovich, U. S. Forest Service, Cody, Wyo.

Harry M. Roller, Jr., Woodlands Department, International Paper Company, Mobile 9, Ala.

George Stenzel, College of Forestry, University of Washington, Seattle 5, Wash.

This committee is charged with the following duties:

1. To set the date of the election. (December 5, 1959, is the date.)

2. To provide for at least two candidates for the office of president, and at least nine candidates for membership on the Council.

3. To receive separate nominating petitions for the office of president and for each member of the Council, and to supplement such petitions when necessary with other nominations in order to comply with item 2 above.

The Nominating Committee will make no nominations of its own unless the voting membership fails to make the required minimum number of nominations by petition. Voting members should accordingly get busy and make their own nominations.

Nominations Received

On the date of going to press the following nominations had been received:

For President

C. A. Connaughton, San Francisco, Calif. (Council member 1958-1959.)

Henry J. Malsberger, Atlanta, Ga. (Vice president 1958-1959.)

E. T. F. Wohlenberg, Ukiah, Calif.

For the Council

B. E. Allen, Savannah, Ga. (Council member 1956-1957 and 1958-1959.)

Kenneth E. Baraclough, Durham, N. H.

William C. Bramble, Lafayette, Ind.

S. T. Carlson, Santa Fe, N. Mex.

James M. Case, Spartanburg, S. C.

Donald E. Clark, Denver, Colo. (Council member 1958-1959.)

Robert W. Cowlin, Portland, Ore.

Kenneth P. Davis, Ann Arbor, Mich. (Council member 1958-1959.)

M. B. Dickerman, St. Paul, Minn.

George A. Garratt, New Haven, Conn. (President 1958-1959.)

W. D. Hagenstein, Portland, Ore. (Council member 1958-1959.)

Albert G. Hall, Washington, D. C.

Svend O. Heiberg, Syracuse, N. Y.

Robert N. Hoskins, Richmond, Va.

Horace R. Josephson, Washington, D. C.

Clemens M. Kaufman, Gainesville, Fla.

Arthur W. Nelson, Hamilton, Ohio.

Harrod B. Newland, Frankfort, Ky.

Wm. Morris Palmer, Jr., Good Pine, La.

Richard J. Preston, Raleigh, N. C.

Waller H. Reed, Chester, Calif.

Charles L. Tebbe, Missoula, Mont.

James K. Vessey, Atlanta, Ga.

L. T. Webster, Olympia, Wash.

Harry R. Woodward, Pierre, S. D.

John Zivnuska, Berkeley, Calif.

In discharging our duties for the 1959-60 election, the nominating committee wishes to express its sincere appreciation to those Society members who originated or signed petitions in favor of their preferred candidates. This cooperation has greatly simplified our task and forestalled any necessity of this committee being forced into the undemocratic process of completing a slate of candidates as required by the Constitution of the Society.

Whatever the outcome of this election might be, we feel quite certain that capable leaders will have been selected. To them we offer our congratulations and best wishes for a successful term of office. We feel certain, too, that the unsuccessful candidates and the entire membership share these sentiments.

HARRY WM. DENGLER, *Chairman*
Nominating Committee

Last Call for Fellow Nominations

All Members (formerly Senior Members) and Fellows of the Society are hereby advised that nominations for the grade of Fellow are now open. The election of Fellows will be held at the time of the Society's regular biennial election, December 5, 1959.

As defined by the Constitution (Article III, Section 7), "Fellows shall be foresters recognized generally throughout the profession as persons who have rendered outstanding service to forestry and to the Society. They shall be elected from the Members."

Nominations by Petition

The procedure for placing Members in nomination for the grade of Fellow is by petition. The Society has no printed form for this purpose; the petition may be typewritten thus:

We, the undersigned Members and Fellows of the Society of American Foresters, hereby nominate John Doe for election to the grade of Fellow in 1959.

Remember these simple rules:

1. A petition may not name more than one candidate.

2. It must be signed by not less than 25 Members or Fellows in good standing.

3. It should be accompanied by a factual, not eulogistic, biographical sketch of at least 300 words giving an account of the nominee's professional career and accomplishments.

4. It must be received in the executive office of the Society in Washington, D. C., not later than September 19, 1959.

The executive employees of the Society cannot be responsible for obtaining signatures on partially completed petitions or on petitions incomplete by reason of unacceptable signatures (that is, signatures of other than Members and Fellows in good standing).

Election Procedure

Fellows are not elected by the membership at large, but by a board of electors which consists of all present Fellows, the Council, the chairmen of the 21 Sections, and the chairmen of the 9 subject Divisions.

The system is described in Article IV, Section 4 of the Constitution. To win election a nominee must receive an affirmative vote of not less than one-half the total number of votes cast, as provided in Bylaw 11.

For the 1959 election there will be 128 electors, of whom 88 are Fellows. An elector has one vote only. A Fellow who is also a Council member has but one vote.

Significance of the Grade

The highest membership distinction that can be conferred by the Society, this grade is awarded in recognition of outstanding service to forestry and to the Society. Fellows do not pay increased dues; their dues are the same as those of Members.

Since the Society was founded in 1900, there have been 125 Fellows elected. At the present time the number of living Fellows is 88.

Since the last election in December 1957, three Fellows have died: S. R. Gevorkiantz of Minnesota, J. S. Holmes of North Carolina, and F. W. Morrell of Virginia.

A list of the current fellows was published in the May issue of the JOURNAL.

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Fellow Nominations

On the date of going to press the following Members had been nominated for the grade of Fellow:

N. T. Barron, Franklin, Va.

Charles A. Connaughton, San Francisco, Calif.

William H. Cummings, Centralia, Wash.

John W. Duffield, Nisqually, Wash.

Clifford H. Foster, Warrensburg, N. Y.

Bishop F. Grant, Athens, Ga.

L. R. Grosenbaugh, New Orleans, La.

V. L. Harper, Washington, D. C.

George B. Hartman, Ames, Iowa.

Richard Kilbourne, Norris, Tenn.

Harold S. Newins, Gainesville, Fla.

Carl I. Peterson, Nashville, Tenn.

Arthur W. Sampson, Berkeley, Calif.

F. X. Schumacher, Durham, N. C.

Calvin B. Stott, Milwaukee, Wis.

Lewis M. Turner, Logan, Utah.

Harold G. Wilm, Albany, N. Y.

Ernest Wohletz, Moscow, Idaho.

SAF MEMBERSHIP BY SECTION (JUNE 30, 1959)

Section	Rank	Total	Junior	Member	Fellow	Affiliate	Associate	Student
1. Allegheny	8	697	258	318	4	19	10	88
2. Appalachian	4	900	275	447	5	53	4	116
3. Central Rocky Mountain	16	270	88	144	1	7	4	26
4. Central States	13	411	120	207	1	18	7	58
5. Columbia River	2	1,257	479	632	5	70	17	54
6. Gulf States	3	978	290	447	4	138	19	80
7. Inland Empire	19	243	86	108	3	11	4	31
8. Intermountain	15	284	91	130	1	13	2	47
9. Kentucky-Tennessee	18	245	77	147	..	15	6	..
10. New England	9	594	146	309	7	61	13	58
11. New York	12	431	113	233	6	22	10	47
12. Northern California	6	818	246	452	9	53	18	40
13. Northern Rocky Mountain	14	327	96	136	..	23	4	68
14. Ozark	11	466	135	187	2	82	5	55
15. Puget Sound	7	740	261	320	7	83	21	48
16. Southeastern	1	1,449	500	659	5	59	19	207
17. Southern California	20	118	38	64	3	9	4	..
18. Southwestern	18	245	81	136	1	26	1	..
19. Upper Mississippi Valley	10	519	143	216	3	27	11	119
20. Washington, D. C.	17	265	29	192	9	6	29	..
21. Wisconsin-Michigan	5	863	252	364	4	59	15	169
No Section affiliation[1]	..	267	74	172	8	10	3	..
Corresponding Members	..	139	..	..	..	..	..	..
Honorary Members	..	20	..	..	..	..	..	..
Total membership	..	12,546	3,878	6,020	88	864	226	1,311

[1]Includes members who have requested that they not be designated members of any Section.

The Blight of Politics on a Career in Forestry

(*Editor's note.*—The following letter will illustrate the extent to which partisan politics can jeopardize an honorable and productive career in forestry. The writer lost his position in the Kentucky Division of Forestry, not because he engaged in politics, but because as a professional forester he considered his career as apart from politics.)

June 16, 1959

Mr. Laban P. Jackson
Commissioner
Department of Conservation
Capitol Annex
Frankfort, Kentucky

Dear Laban:

This is in answer to your letter dated June 15th, and received on June 16th, advising me that I would be dismissed from the Division of Forestry, effective June 15th. I am sorry you have denied me the two weeks' notice of dismissal which you promised yesterday and last Wednesday.

When I talked with you last week you stated I was being dismissed because of political activity in the recent election. Your letter says I am being dismissed because my job is being abolished. It really makes little difference, because I am sure most people will understand the real reason.

The truth is I have always considered myself a career employee who could best serve the forestry interests of Kentucky by tending strictly to forestry matters. Also, there are cooperative agreements with the federal government, as well as the Hatch Act,

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which require forestry employees to refrain from political activity.

There seems to be no question about my ability, diligence, or character. As you know, I have faithfully served the Commonwealth through the Division of Forestry for nearly 26 years, 13 of them as Director of the Division. My goal has always been to build the forestry program and organization needed to protect and develop the State's vital forest resources. The record speaks for itself.

When I began my work only five people were employed in the Division, the total budget was less than twenty thousand dollars, and goals were rather vague. When I was demoted to Associate Director two years ago about 125 people were employed full time, and the budget amounted to nearly one million dollars. Goals were clear, the Division was on its way.

Many of the hard battles had been fought and won, especially those of overcoming apathy and winning public support. Forest industries, landowners, and the general public are now ready to unite behind an effective forestry leadership with a sound program.

Some of the finest men and women in State government work in the Division of Forestry. Most of them are dedicated and highly competent individuals.

For these reasons I will continue to watch the Division of Forestry with a great deal of interest. It is my hope that the Division of Forestry will continue to grow as it must, and that the good employees of the Division will get the job protection they need.

Yours truly,

Harrod B. Newland
207 Crestwood Drive
Frankfort, Ky.

Years of Forestry Experience of Society Members

Early in 1959 the members of the Society were requested to fill in a postal card questionnaire giving their opinions on various aspects of the JOURNAL OF FORESTRY. While primarily intended as a sort of poll on readership interests, one of the questions was intended to determine the years of forestry experience of each respondent.

About 5,100 of the Society's 12,000 members returned the questionnaires. Of those reporting, their years of forestry experience are as follows:

Years of forestry experience	Percent
Less than 5 years	33
5 years to 10 years	23
11 years to 25 years	27
More than 25 years	17

These percentages are probably roughly applicable to the profession at large. If so, they indicate that forestry is still a relatively young man's profession for 56 percent have less than 10 years of forestry experience, and 83 percent have less than 25 years of experience.

Subscription Rate Increased Journal of Forestry

Effective January 1, 1960 annual subscription rate to the JOURNAL OF FORESTRY will be increased to $9. Foreign postage ($1) and Canadian postage (50¢) remain the same.

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the JOURNAL OF FORESTRY, beginning with the January 1960 issue will be payable at the increased rate.

SAF Consulting Foresters Directory to be Published

Persons and firms listed in the SAF Consulting Foresters Directory published in the January 1959 JOURNAL OF FORESTRY have been requested by mail to approve, correct, or revise their listings for the new directory to be published in the January 1960 JOURNAL.

Members doing consulting forestry work and whose names have not previously appeared are invited to apply now for listing. They should provide complete information following the form used in the List of Consulting Foresters published in the January 1959 JOURNAL OF FORESTRY. Society membership is a prerequisite for listing. Such members must be in good standing, i.e., have paid their 1959 dues. Consulting firms will be listed if one or more of the partners or employees are members of the Society.

November 1, 1959 is the last date on which listings will be accepted for publication in the January 1960 directory.

Ozark Section Elects Officers

The following officers were elected by the Ozark Section for the year which began July 1, 1959:

Chairman—Richard C. Smith, Forestry Department, University of Missouri, Columbia, Mo.

Vice Chairman—Harold S. Winger, International Paper Company, P. O. Box 278, Pine Bluff, Ark.

Secretary-Treasurer—Manley L. Markell, Dierks Lumber Company, McQueen, Ark.

Central Rocky Mountain Section Elects Officers

Results of the recent election of officers for the Central Rocky Mountain Section for the two-year period beginning July 1, 1959, were:

Chairman—C. Gordon Wyatt, Durango, Colo.

Vice Chairman—James L. Wenban, Fort Collins, Colo.

Secretary-Treasurer—Elmer W. Shaw, 221 Forestry Bldg., Colo. State University, Fort Collins, Colo.

The members also voted 135 to 15 in favor of a two-year term for the new officers.

Kentucky-Tennessee Section Meets

Nearly 90 foresters from Kentucky and Tennessee and nearby states met June 29-30 on the campus of the University of The South, 7,000 acres of which are in hardwood forest managed by Sewanee's forestry department.

The forestry department, headed by Prof. Charles E. Cheston, co-hosted the meeting along with the Sewanee Research Center, of the U. S. Forest Service, Southern Forest Experiment

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RECREATIONAL USE OF WILD LANDS By C. Frank Brockman, Professor of Forestry, College of Forestry, University of Washington. *McGraw-Hill American Forestry Series.* 346 pages, $8.50.

FOREST FIRE: CONTROL AND USE by Kenneth P. Davis, Professor of Forest Management, and Chairman of the Department of Forestry, School of Natural Resources, University of Michigan. *McGraw-Hill American Forestry Series.* 584 pages, $12.00

NATURAL RESOURCES by M. R. Huberty, Department of Engineering, University of California, Los Angeles; and W. L. Flock, Associate Engineer and Lecturer, Department of Engineering, University of California, Los Angeles. *McGraw-Hill UCLA Extension Series.* 556 pages, $11.00.

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Station, headed by Arnold Mignery.

Field trips began with a visit to the Forest Soils Laboratory of the Sewanee Research Center and then to two studies on the university domain —one on the timing of release for planted shortleaf pine and another on direct seeding of loblolly pine.

Next stop was at the 23-year-old loblolly pine plantation managed by Sewanee's forestry department. The 4.4-acre plantation, that already earns about $14 per acre, should yield 20,000 board feet per acre with a per acre gross money yield of $733 when the stand is 50 years old. The group also visited a cove hardwood management area supervised by Henry W. Smith of Sewanee's forestry department.

After lunching at the Grundy State Forest, Tracy City, Tenn., the foresters visited a private woodland and a tract converting low-grade hardwoods to pine managed by the Hiwassee Land Company.

The program also included a report from TVA representative John Allen of Norris, Tenn., on the cooperative loblolly-shortleaf pine site index study made in June 1958 in Mississippi, Alabama, and Tennessee.

Chairman of the Kentucky-Tennessee Section is E. G. Wiesehuegel of TVA's forestry relations division in Norris, Tenn., and chairman of the summer meeting committee was Louis H. Camisa, forest manager of Bowaters Paper Company, Calhoun, Tenn.

Joint Meeting of Georgia Chapter and Alumni Association

Dean Allyn M. Herrick of the University of Georgia's George Foster Peabody School of Forestry has been commended for the high-level publicity he has obtained for the School and the manner in which he has kept the needs and requirements of the School before the public.

The Dean was paid this tribute by the Steering Committee of the University of Georgia Forestry School Alumni Association at its joint meeting with the Georgia Chapter, Society of American Foresters, in Savannah, June 11-12.

The highlight of the meeting, attended by some 160 members, was a talk by Ernest Rogers, editorial page columnist of the *Atlanta Journal*.

"Forestry Around the World" was the theme of the final day's activities.

Ben Meadows, owner of Ben Meadows Company, Atlanta, was elected president of the Forestry School Alumni Association.

Membership Applications and Advancements

Proposals for admission, advancement, and reinstatement received in the Society office during the month of July are listed below.

Action on the eligibility of those proposed for membership as listed below will be taken by the Council as of September 1959.

Communications from the voting members regarding the membership eligibility of these persons should be received in the Society office prior to that date.

Allegheny Section

Junior Grade

Adams, R. T., Editor, N. J. Div. of Fish & Game, Westwood, N. J. (Reinstatement).
Ballantyne, J. N., Forester, USFS, Upper Darby, Pa., Univ. of Minn., BSF, 1941.
Kirkwood, H. C., Expediter, Columbia Southern Chemical Corp., Pittsburgh, Pa. (Reinstatement).
Mailman, P. E., County Forester, Franklin, W. Va., Univ. of Mass., BSF, 1959.

Affiliate Grade

McGinnes, E. A., Research Chemist, Ketchikan Pulp Co., Marcus Hook, Pa.

Appalachian Section

Junior Grade

DeBerard, D. J., Forester, W. Va. Pulp & Paper Co., Georgetown, S. C. (Reinstatement).
Tuttle, W. A., Forester, USFS, Murphy, N. C., N. C. State College, BSF, 1950.

Central Rocky Mountain Section

Student Grade

COLORADO STATE UNIVERSITY
Anderson, C. R.

Columbia River Section

Junior Grade

Fellows, L. A., Rt. 2, Box 172, Milton-Freewater, Ore. (Reinstatement).
Mayer, B. J., Forester, Bur. of Land Mgmt., Roseburg, Ore., Mich. College of Mining & Tech., BSF, 1957.
McCurdy, R. E., Dist. Ranger, USFS, Oakridge, Ore. (Reinstatement).
Pratt, H. L., Asst. Dist. Ranger, USFS, Prospect, Ore. (Reinstatement).

Affiliate Grade

Kadaja, P., Forester, Bur. of Land Mgmt., Roseburg, Ore.
McAndie, I. D., Dist. Asst., USFS, Maupin, Ore.

Gulf States Section

Junior Grade

Bolton, F. T., Asst. Dist. Forester, The Crossett Co., Crossett, Ark., La. State, BSF, 1959.

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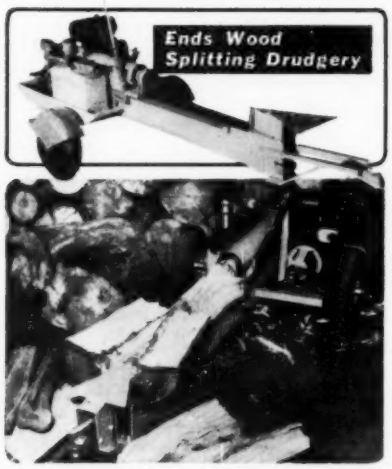

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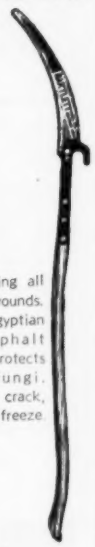

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Inland Empire Section

Student Grade

Showalter, D. J. (Reinstatement).

Junior Grade

Showalter, D. J., Jr. Forester, USFS, Grangeville, Idaho, Purdue Univ., BSF, 1959.

Students Eligible for Automatic Advancement

UNIVERSITY OF IDAHO

Amos, A. J.	Hunt, J. D.
Carpenter, S. B.	Johnson, R. S.
Chronic, R. W.	Leach, T. E.
Coats, D. F.	Pence, N. N.
Dews, D. L.	Ragan, R. E.
Ferguson, R. M.	Reveley, T. L.
Finn, R. A.	Steinhoff, R. J.
Flanik, G. R.	Stroup, S. W.
Frazier, J. L.	Volland, L. A.
Harrison, D. L.	Westhaver, B. L. T.

Member Grade

Deepers, W. C., Forester, Bur. of Indian Affairs, Inchelium, Wash., State Univ. of N. Y., BSF, 1955 (Junior 1955).

Intermountain Section

Student Grade

UTAH STATE UNIVERSITY

Zohner, D. L.

Junior Grade

Foltz, W. G., Asst. Dist. Forest Ranger, USFS, Council, Idaho (Reinstatement).

Melvin, C. R., Forester, USFS, Ogden, Utah (Reinstatement).

Newell, M. E., Asst. Forest Ranger, USFS, New Meadows, Idaho (Reinstatement).

Students Eligible for Automatic Advancement

UTAH STATE UNIVERSITY

Zohner, D. L.

Kentucky-Tennessee Section

Member Grade

Archer, J. M., Forester, USFS, Williamsburg, Ky., N. C. State Univ., BSF, 1955 (Junior 1955).

Hill, N. E., Cutting Control Forester, Hiwassee Land Co., Calhoun, Tenn. (Reinstatement).

Northern California Section

Junior Grade

Petersen, C. J., Administrative Officer, Pacific Southwest Forest & Range Expt. Sta., Berkeley, Calif., Iowa State College. BSF, 1949.

Reese, R. A., Dist. Ranger, USFS, Placerville, Calif. (Reinstatement).

Sloat, E., Deputy State Forester, Calif. Div. of Forestry, Monterey, Calif. (Reinstatement).

Affiliate Grade

Ball, E. E., Forest Supv., USFS, Porterville, Calif.

Northern Rocky Mountain Section

Junior Grade

Students Eligible for Automatic Advancement

MONTANA STATE UNIVERSITY

Anderson, R. A. Krammes, J. S.
Johnston, D. T. Lix, R. S.
Muraro, S. J.

Member Grade

Gardner, R. C., Consulting Forester, Self Employed, Kalispell, Mont. (Reinstatement).

Ozark Section

Member Grade

Hogan, J. J., Tech. Supv., International Paper Co., Camden, Ark. (Reinstatement).

Affiliate Grade

Harbour, H. G., Forester, International Paper Co., Amity, Ark.

Southeastern Section

Junior Grade

Aspinwall, L. G., Wood Buyer, Rayonier Inc., Jesup, Ga., Univ. of Ga., BSF, 1950.

Harrison, J. S., Asst. Dist. Forester, Ga. Forestry Comm., Washington, Ga. (Reinstatement).

Redding, B. W., Working Circle Forester, St. Regis Paper Co., Century, Fla., Univ. of Fla., BSF, 1955.

Member Grade

Bailey, J. C., Forester, Rome Kraft Co., Rome, Ga., Mich. State Univ., BSF, 1956. (Junior 1956).

Foster, J. U., Manager, Atlantic Creosoting Co., Savannah, Ga. (Reinstatement).

Affiliate Grade

Toomey, W. M., Unit Forester, International Paper Co., Chatom, Ala.

Southern California Section

Junior Grade
Students Eligible for Automatic Advancement

UNIVERSITY OF CALIFORNIA

Utterback, R. C.

Member Grade

Biddison, L. R., Dist. Ranger, San Bernardino Natl. Forest., Fontana, Calif. (Junior 1951).

Southwestern Section

Junior Grade

Dunston, R. L., Forester, USFS, Albuquerque, N. M. (Reinstatement).

Jones, D. P., Logging Eng., Southwest Lbr. Mills, Maverick, Ariz., Pa. State Univ., BSF, 1950.

Upper Mississippi Valley Section

Junior Grade
Students Eligible for Automatic Advancement

UNIVERSITY OF MINNESOTA

Aaberg, R. J. John, H. H.
Bakuzis, E. V. Johnson, R. B.
Berg, R. O. King, R. C.
Billings, R. S. Luetgers, E. P.
Bodine, R. O. Nelson, A. L.
Bohn, G. R. Oien, W. O.
Carlson, H. N. Olson, B. R.
Chisholm, D. K. Schacht, A. J.
Clark, R. F. Shumway, C. A.
Clausen, P. J. Sievers, R. G.
Fenstad, B. G. Skinner, R. W.
Glowacki, W. E. Stefan, M. E.
Groothousen, C. P. Trochlil, R. C.
Hansen, E. A. Vandermillen, E. J.
Heath, W. L. Weber, F. P.
Huff, R. M. Westerdahl, W. G.
Wollum, A. G.

Washington Section

Junior Grade

Davis, A. A., Special Asst., Outdoor Recreation Resources Review Comm., Wash., D. C. (Reinstatement.)

Associate Grade

Elchibegoff, I. M., Research & Consulting Economist, Self Employed, Wash., D. C.

Wisconsin-Michigan Section

Junior Grade

Feero, C. E., Dist. Forester, Celotex Corp., Champion, Mich., Univ. of Minn., BSF, 1950.

Reinke, M. L., Forester, USFS, Rhinelander, Wis. (Reinstatement).

Wallace, W. J., Dist. Forester, Mich. Dept. of Cons., Manistique, Mich., Mich. State Univ., BSF, 1951.

No Section

Member Grade

Donahue, R. L., Prof. of Agronomy, Kansas State Univ., Manhattan, Kans. (Reinstatement).

Corresponding Grade

Khalil, M., Director, Pakistan Forest College & Research Institute, Peshawar, Pakistan.

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Forestry News

J. Alfred Hall

Edward G. Locke

Retirement of Forest Products Laboratory Director Announced

Dr. J. Alfred Hall retired August 31 as director of the U. S. Forest Products Laboratory Madison, Wis., and was succeeded by Dr. Edward G. Locke, chief of the institution's division of wood chemistry for the past eight years.

The retiring director said he will take up residence in Portland, Ore., where he will do consulting work for industrial concerns in the forest products field.

Dr. Hall's directorship of the Laboratory has been highlighted by his participation in a presidential commission task group in 1957 that recommended greatly increased research on wood to utilize effectively much low-quality timber, as well as industrial wastes.

The commission report included the recommendations of his task group, and has been submitted to Congress.

He retires as only the fifth director in the nearly half century that the Laboratory has been in existence. He began his Forest Service career in 1930 as a biochemist on the Laboratory staff, specializing in research on the resin production of southern pines. In 1937 he was appointed assistant director of the California (now Pacific Southwest) Forest Experiment Station at Berkeley.

Since then he has been director of the Central States Forest Experiment Station at Columbus, a specialist on research problems with the Forest Service headquarters staff at Washington, D. C., during the war and, for six years before coming back to the Laboratory as its director, served as director of the Pacific Northwest Forest Experiment Station in Portland, Ore.

Dr. Hall is a native of Paoli, Ind., and attended Earlham College and Indiana University in that state. He earned his B.A., M.S., and Ph.D. degrees in biochemistry at the University of Wisconsin. Before going to the Laboratory in 1930, he was a research biochemist for private concerns.

Among his scholastic and professional affiliations are memberships in

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Phi Beta Kappa, Sigma Xi, and the American Chemical Society. He is a fellow of the Society of American Foresters.

Dr. Locke is a native of Portland, Ore. He was graduated as a chemical engineer from Oregon State College in 1928 and received his Ph.D. in organic chemistry from Ohio State University in 1932.

Dr. Locke is a past national president of the Forest Products Research Society.

AAAS Annual Meeting

The 1959 meeting of the American Association for the Advancement of Science (Section O—Agriculture), with which the Society of American Foresters is affiliated, will be held December 28-31 at the Morrison Hotel, Chicago. The symposium for Section O will be titled "Germ Plasm Resources in Agriculture: Development and Protection."

Alaskan Forest Fires Called National Disgrace

Major conservation organizations this summer told President Eisenhower that forest fires then raging on more than 160,000 acres of public lands in Alaska were a national disgrace. Their telegram called attention to the lack of funds, facilities, and equipment for Bureau of Land Management fire suppression purposes in the new state. It was sent by the American Forestry Association, American Nature Association, Izaak Walton League of America, National Wildlife Federation, Sport Fishing Institute, The Wilderness Society, and Wildlife Management Institute.

As of July 2, 78 fires were burning 160,000 acres of BLM lands in Alaska. Firefighters were on only 27 of the fires; the remainder were unmanned. One unmanned and uncontrolled fire was estimated to have burned 50,000 acres, and severe electrical storms were causing new fires at the rate of 12 a day.

Fire Research Conference Planned

The Committee on Fire Research and the Fire Research Conference of the Division of Engineering and Industrial Research of the National Academy of Sciences-National Research Council is planning a two-day international symposium on the theme "The Use of Models in Fire Research" to be held at the National Academy of Sciences in Washington, D. C., on November 9 and 10, 1959.

The meeting will be concerned with the use of models in predicting fire behavior on a large scale. Modeling, applied with considerable success to many combustion problems, has had almost negligible application in studying fire growth and spread.

Contributions have been announced from Japan, England, France, Germany, and the United States.

Attendance at the symposium must necessarily be limited and will be by invitation. Those actively interested in basic research on fire and the spread and growth of fire should indicate their interest and request advance registration cards. Address all communications to Mr. D. W. Thornhill, Executive Secretary, Committee on Fire Research and Fire Research Conference, National Academy of Sciences, 2101 Constitution Avenue, Washington 25, D. C.

The Committee on Fire Research and the Fire Research Conference are sponsored by the Office of Civil and Defense Mobilization, the Department of Defense and the U. S. Forest Service of the Department of Agriculture. The membership of the Committee and Conference includes leading scientists who are interested in a more complete understanding of free-burning fire.

Beetles Imported to Save Fir Forests

Beetles that prey on the balsam woolly aphid are being introduced into this country from West Germany in an attempt to control this forest-destroying insect, the U. S. Department of Agriculture has announced.

Arrangements have been made to obtain approximately 20,000 of these beetles, *Laricobius erichsonii*, for use in a pilot control test in Maine and for establishment of a colony in North Carolina. The plan is a joint venture of USDA's Agricultural Research Service and Forest Service, with assistance from the British Commonwealth Institute of Biological Control.

Raphael Zon Photo Presented to Israeli Research Station

An enlarged photograph of the late Raphael Zon, sometime editor of the JOURNAL OF FORESTRY and for many years director of the Lake States Forest Experiment Station, was presented on June 22 to the Ilanoth Forestry Research Station near Nathanya in Israel.

The donors of the picture were jointly the Society of American Foresters and the U. S. Forest Service. The photograph now hangs in the conference room of the Zon Silvicultural

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Laboratory at the Research Station.

Grover Chappell, U. S. agricultural attache at Tel Aviv, made the presentation in behalf of the American donors at a ceremony attended by Dr. A. Y. Goor, conservator of the Department of Forests, Ministry of Agriculture; forestry employees; friends of the Ilanoth Station, and USOM officials.

Although Mr. Zon's long and fruitful career was dedicated to the advancement of American forestry, his interests were worldwide with considerable concern for forestry in Israel. Before his death he had donated valuable volumes from his personal library to the Ilanoth Station.

As a great American forester of Jewish descent, Mr. Zon's memory is now perpetuated by the silvicultural laboratory that bears his name. It is staffed by two graduate foresters and several technical assistants.

J. J. Levison to Be Honored by Israeli Forestry Center

J. J. Levison, consulting forester of Sea Cliff, Long Island, N. Y., will be honored in 1960 by the Ilanoth Forest Experiment Station in Israel when the library will be dedicated as the Levison Forestry Library. Having more than 1,000 volumes, mostly on forestry in arid zones, this library is considered to be one of the best on the subject.

With the silvicultural laboratory dedicated to Raphael Zon, the wood technology laboratory to the late Mr. Boas of Australia, and the forestry library to Levison, three prominent foresters, all descendants of Jewish families, have been honored by the Israeli Department of Forestry.

Industrial & Private

Steady Growth of Tree Farms Reported

American Forest Products Industries, Inc., reports 49,443,582 acres in certified Tree Farms as of July 1, 1959.

As of that date, the American Tree Farm System counted 15,043 tree farms, an increase of 24 percent during the past year. The figures reflected an increase of 1,014,131 acres since January 1.

The sponsors expected the 18-year-old Tree Farm System to reach the 50 million-acre mark by late summer. Nebraska is the latest state to join the program, having named a Tree Farm Committee in June.

Leaders in the program include Florida with 4,711,829 certified Tree Farm acres; Georgia, 4,616,173 acres; Alabama, 4,475,070 acres; Oregon, 4,050,226 acres; Washington, 4,036,194 acres; Texas, 3,687,018 acres; Arkansas, 3,488,857 acres; Louisiana, 3,365,194 acres.

Mississippi continues to lead in the number of Tree Farms with 1,589. Other leaders are Alabama, 1,308; Texas, 1,215; Minnesota, 1,029.

SPCA Reports on Tree Planting

According to an 11-state survey conducted by the Southern Pulpwood Conservation Association, 373,000,000 seedlings were planted in the South last year through industry programs. More than 55 percent of these trees were produced by the 18 industry-operated nurseries in the region. Private landowners in the region last year received 57,000,000 trees, and during the last 10 years have received 402,700,000 seedlings from the industry, according to Henry J. Malsberger, of Atlanta, general manager of the SPCA.

Schools

Norton Cope Retires

Professor H. Norton Cope, acting head of the Department of Forest Management and acting director of the School of Forestry, Pennsylvania State University, retired June 30, 1959. Born in Montgomery County, Pa., September 4, 1893, he graduated from Pennsylvania State College with a B.S. in Forestry in 1915. He served in various capacities at Crook, Gilda, Tusayan, Coconino, Alabama-Benning and Ouachita National Forests, and has been at Pennsylvania State University since 1943.

Professor Cope is a member of the SAF, the American Forestry Associa-

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tion, the Pennsylvania Forestry Association, and the Association of American University Professors. He has no definite commitments and will continue to reside in University Park.

Promotions at New York School Announced

Eight members of the faculty of the State University College of Forestry at Syracuse University, Syracuse N. Y., have been promoted recently.

The announcement of the promotions was made by Dr. Hardy L. Shirley, dean of the College of Forestry.

Promoted to full professorships were:

Carmin P. Donofrio, professor of pulp and paper technology; Dr. John L. Morrison, professor of forest botany; Bradford G. Sears, professor of landscape architecture; and Dr. Hugh E. Wilcox, professor of forest botany.

Advanced to associate professorships were:

Russell C. Deckert, associate professor of forest utilization; Dr. Howard C. Miller, associate professor of biology; Dr. Savel B. Silverborg, associate professor of forest pathology; and Gerald H. Smith, associate professor of forest utilization.

Nutting Elected Chairman Research Advisory Council

Albert D. Nutting, director of the School of Forestry of the University of Maine, was elected chairman of the Northeastern Forest Research Advisory Council at the Council's annual meeting at Blackwater Falls Lodge, near Davis, W. Va., on June 18-20.

The Advisory Council, which has been in continuous operation for 36 years, is a group of state foresters, educators, industrial foresters, and individuals formed to assist and advise the U. S. Forest Service's Northeastern Forest Experiment Station is planning and carrying out research.

Mr. Nutting, who formerly was forest commissioner of the Maine Forest Service, succeeds Karl A. Swenning, Director of Timberlands for the Scott Paper Company, Chester, Pa.

George R. Moorhead, Chief of the Forest Management Section, New Jersey Department of Conservation and Economic Development, was elected vice-chairman of the Council. Ralph W. Marquis, Director of the Northeastern Forest Experiment Station, was re-elected secretary.

The major part of the Advisory Council's 36th annual meeting was devoted to discussion of the increasing demands being made upon forest lands for recreational uses, and in suggesting general and specific fields for research that would help the forest land managers and recreational users.

C. H. Foster Retires from Pack Forest, Potter Appointed

Shelley W. Potter, Jr., has been appointed forest manager of the Charles Lathrop Pack Demonstration Forest (near Warrensburg, N. Y.) of the State University College of Forestry at Syracuse University, (Syracuse, N.Y.), it was announced recently by Dr. Hardy L. Shirley, dean of the college.

Professor Potter succeeds Professor Clifford H. Foster, who is retiring from his post as director of Pack Forest after 32 years' service.

Professor Potter has served as forester-in-charge of both the college's Tully Forest and Syracuse Forest Experiment Station, a position he has held since July 1, 1956, when he joined the college.

He was manager of the school forest of the New York State Ranger School at Wanakena from 1947 to 1949.

From 1952 to 1956, he was engaged in research at Harvard Forest, located at Petersham, Mass.

Commenting on Professor Foster's long career of continuous service to the college, Dean Shirley said:

"Professor Foster has achieved a most outstanding performance of his duties and responsibilities during the more than three decades he has served the college."

In recognition of Professor Foster's many accomplishments and contributions to the College of Forestry over the past 32 years. Dean Shirley stated the college's Board of Trustees has honored him by singling him out and conferring the title of Director Emeritus of Pack Forest upon him as he retires.

Professor Foster was born in Hampton Bays, Long Island. He received his basic forestry training at the College of Forestry, which he later served during most of his professional career. He obtained his Bachelor of Science degree in 1921.

Richard Skok Joins Minnesota Staff

Richard Skok has been appointed to the staff of the University of Minnesota School of Forestry, according to Frank H. Kaufert, director of the School.

A native of St. Paul, Skok received his B.S. in forestry at the Uni-

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versity in 1950, his Master of Forestry in 1954, and was a research assistant there until early 1958.

He then went to Montana State University, where he remained until returning to Minnesota.

Skok will teach forest economics, production, and marketing, and will do research in forest economics.

New Staff Members, School of Forestry, University of Florida

Dr. Edward T. Sullivan, formerly assistant professor, School of Forestry, University of Minnesota, became associate professor and forest economist on July 1, 1959, replacing Thomas G. Herndon, who has served since 1957 as associate farm forester, Agricultural Extension Service at the University.

Dr. Tom O. Perry, presently at the California Institute of Technology and who will join the staff of North Carolina State College in January, has been replaced by Professor Ray E. Goddard, who has been engaged since 1948 in research in silviculture and forest tree improvement work with the Texas Forest Service. Goddard will be assistant professor of forestry.

Two National Defense Fellowships Awarded in Watershed Management

Colorado State University recently was awarded two National Defense Fellowships for graduate study in watershed management by the United States Department of Health, Education and Welfare. The fellowships are designed for training additional college and university teachers.

Mr. Richard Lee and Mr. Roger Hoffer, both 1959 honor graduates in forestry at West Virginia University and Michigan State University respectively, have been named the recipients of these fellowships starting in September 1959.

In addition to the two in watershed management the University was awarded three fellowships in botany and two in soil science.

Public

Moran Named California Chief Deputy State Forester

Appointment of Lewis A. Moran of Monterey, Calif., as chief deputy state forester has been announced by State Forester F. H. Raymond. Moran, who as deputy state forester, has been in charge of the California Division of Forestry's South Coast District for several years, took over his new duties in Sacramento effective July 1.

Moran graduated with a degree in forestry from the University of California and entered state service in 1938. With the exception of three years he served in the Navy during World War II, he has continued with the state, and earned promotions through the ranks to this position.

Cecil Metcalf, who accepted an interim appointment as chief deputy after John Callaghan resigned to enter private employment earlier this year, will return to Fresno and resume his position as deputy state forester in charge of the San Joaquin District.

Emery Sloat, assistant deputy state forester in Santa Rosa, will be promoted to deputy state forester, Raymond said, to replace Moran in Monterey.

Heads Forest History Foundation

Bernard L. Orell of Tacoma, Wash., has been elected president of the Forest History Foundation, with headquarters in St. Paul, Minn., succeeding Theodore C. Blegen of the University of Minnesota. Mr. Orell is a vice president of Weyerhaeuser Timber Company.

Elwood R. Maunder was reelected as director.

The Foundation's headquarters is at 2706 West Seventh Boulevard, St. Paul 16, Minn.

Heads Forest Recreation Research

Harry W. Camp has been selected to head up forest recreation research for the U. S. Forest Service. His transfer from the Division of Program Planning in the Washington Office, where he has been assigned since August 1957, was effective July 15.

A graduate of the University of California, Camp entered the Forest Service in 1933. After working on research in forest influences at the California Station for two years he transferred to National Forest Administration in Region 5. Here he served as district ranger and resources staff officer on six different national forests and in the regional office in Personnel Management. In 1947, he returned to research as field supervisor of the Forest Survey in California. Subsequently he served as director of the Forest

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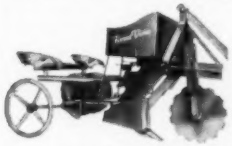
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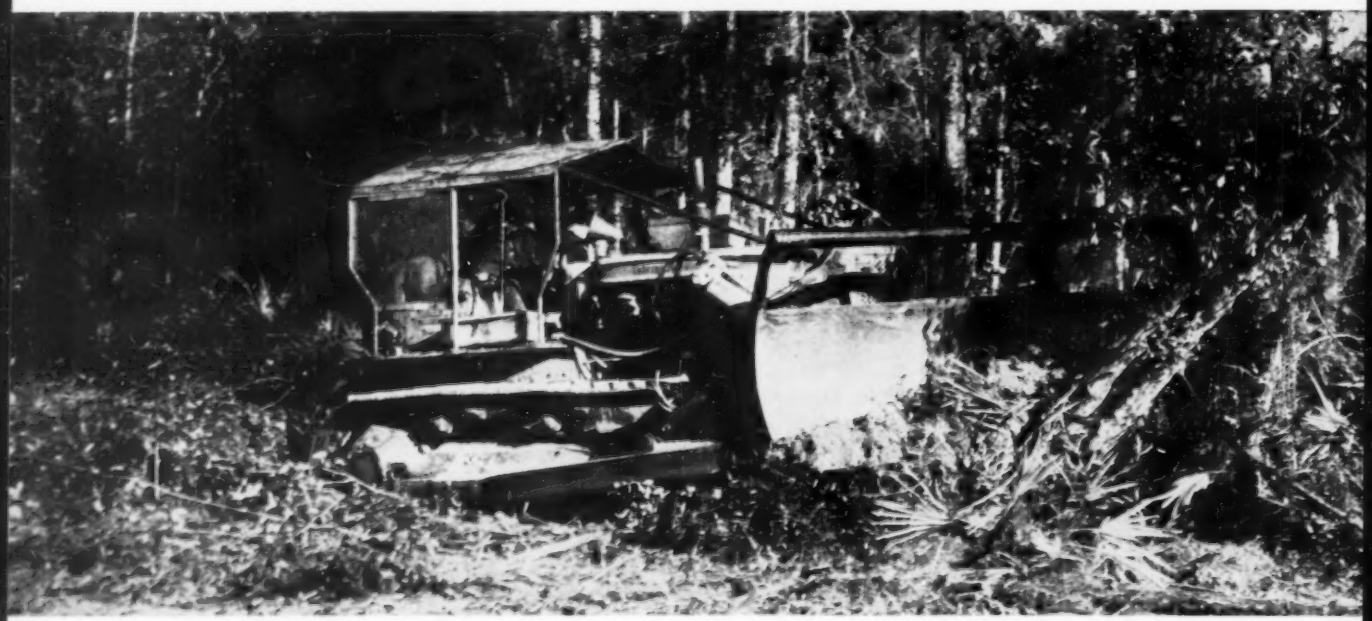

An acre an hour is good production in this going. But just as important is the *way* the D6 with a Rome K/G Clearing Blade handles the job. Forester Wess Whiddon of the Weaver-Loughridge Lumber Co. in Boyd, Florida, makes this comment on its performance: "The K/G Blade is rugged. It is doing more than we expected. It piles debris very well—does not take topsoil. You can't beat a D6 for this type of work."

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Survey in the Northeastern Region and as division chief in charge of Economic Studies and Forest Survey at the Northern Rocky Mountain and Intermountain Forest and Range Experiment Stations. During his assignment with the Division of Program Planning Camp has been primarily concerned with the development of projections of future recreation demand on the national forests, to be used in connection with the National-Forest Outdoor Recreation Resource Review.

Forest Supervisor Transfers in Southwest

A number of U. S. Forest Service transfers have been announced in the Southwest by Regional Forester Fred H. Kennedy of Region 3.

George R. Proctor, range and wildlife management specialist in the regional office for the past year, has been appointed supervisor of the Carson National Forest, Taos, N. Mex.

Fred O. Leftwich, for seven years supervisor of the Tonto National Forest, Phoenix, Ariz., has been transferred to the post of chief of range management of Region 2, Denver, Colo.

E. Lavelle Thompson, until recently

JOHN FEDKIW

training and safety officer of Region 3, has been appointed supervisor of the Apache National Forest, Springerville, Ariz.

K. M. Daniels has left the supervisor post on the Apache to head up the Employment Section, Division of Personnel Management in the Washington office of the Forest Service.

Forest Economist Joins Experiment Station Staff

Appointment of Dr. John Fedkiw, assistant professor of forest economics at New York State University College of Forestry, to the staff of the Pacific Northwest Forest and Range Experiment Station was announced recently by Director R. W. Cowlin.

Dr. Fedkiw assumed his new duties at the U. S. Forest Service research unit July 1, filling a vacancy in the division of forest economics research. As leader of the section of production economics, he will direct studies on the economics of growing, harvesting, and marketing forest products in the Pacific Northwest.

Dr. Fedkiw received a bachelor of science degree in forestry from New York State College of Forestry in 1942 and a doctorate in economics from Cornell University in 1953. He joined the faculty of the College of Forestry in 1947.

During World War II Fedkiw spent 3 years in the Navy, serving as photo-

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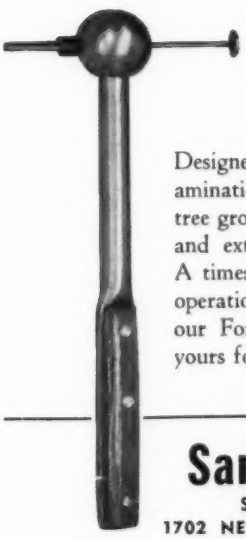

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Returns to Lake States Staff

Dean N. Quinney, for the past two years assistant professor of forest economics at Utah State University, has rejoined the staff of the U. S. Lake States Forest Experiment Station. This was announced by M. B. Dickerman, director of the Station.

Quinney holds the degrees of B.S.F. from Pennsylvania State University and M. F. from Michigan State University. Before going to Utah State University he worked for the Lake States Station making forest resource investigations in Michigan and Minnesota and doing research on the techniques of forest inventories. His new assignment will be to head up the Station's research in the marketing of forest products in the Lake States.

Pacific Northwest Foresters Promoted

Promotion and transfer of two U. S. Forest Service officials has been announced by Regional Forester J. Herbert Stone of the Portland, Ore., regional office.

Alfred A. Wiener of the regional office Division of Timber Management, moved in August to a timber management staff position in the Chief Forester's office in Washington, D. C.

John E. Todd, district ranger on the Randle District, Gifford Pinchot National Forest, Randle, Washington, moved to Portland as Wiener's replacement. His transfer was effective July 26.

Wiener graduated in 1942 from Oregon State College School of Forestry. After graduation he entered the U. S. Army where he served until his discharge in 1946.

Todd served in the U. S. Army 1943-1946 and graduated in forestry from the University of Washington in 1947.

Two Denver Foresters Promoted

Promotion and transfer of two U. S. Forest Service officials was recently announced by Regional Forester Donald E. Clark at the Denver regional office.

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KENNETH O. WILSON

K. O. Wilson, head of the Branch of Fire Control and Information, moved August 1 to the Chief Forester's office in Washington, D. C., where he replaced E. M. Bacon as head of specialized forest fire control training.

E. J. Fortenberry, branch head of Land Management Planning and Watershed Management, transferred to Ogden, Utah, as assistant regional forester in charge of Information and Education for the Intermountain Region of the Forest Service. His transfer was effective in July.

Previous to assignment in the Denver office, Wilson was supervisor of the Shoshone National Forest at Cody, Wyo. Fortenberry served as supervisor of the Medicine Bow Forest at Laramie from 1951 to 1957.

A graduate of Oregon State College, School of Forestry, Wilson started with the Forest Service in 1930. He has served in numerous technical and administrative capacities in New Hampshire, Arizona, and New Mexico since that time.

Fortenberry attended Schools of Forestry at Mississippi State College, Louisiana State University and the University of California where he received his degree. Beginning his career with the Forest Service in 1931 he has served in various capacities on the Black Hills National Forest in South Dakota and the Rio Grande, Roosevelt and Gunnison Forests in Colorado.

E. J. FORTENBERRY

Clark said that Wilson will be succeeded by Spencer Moore, staff officer on the Rogue River National Forest. Moore will transfer to Denver from Medford, Ore.

Milton M. Wright, in charge of range studies in the regional Division of Range and Wildlife Management, will follow Fortenberry as head of the Branch of Land Management Planning and Watershed Management.

R. D. Lane Promoted

Richard D. Lane, for the past 2½ years chief of the Division of Forest Management Research at the Northeastern Forest Experiment Station, has been transferred to Washington, D. C. He was named to the position of assistant Director of the Division of Forest Management Research.

Lane succeeds Bert R. Lexen who is now with the Foreign Research and Technical Programs Division of the Agricultural Research Service.

To Head Southeastern Disease Survey

Dr. Harry R. Powers, Jr., recently joined the Division of Forest Disease Research at the Southeastern Forest Experiment Station, Asheville, N. C. He will head up forest disease surveys and assist in other aspects of the Station's forest disease program.

Before joining the Forest Service, Dr. Powers was employed by the De-

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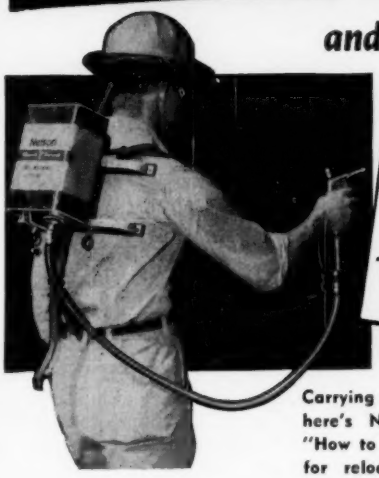

Carrying more paint but pounds *lighter*, here's Nelson's answer to the problem "How to mark more trees with fewer stops for reloads"—on plantations—other big operations.

NO HEAVY CONTAINER

Using the pumping action of its new easier-operating Nel-Spot Gun to pull paint through the hose, the Nel-Spot Back Pack requires no compressed air, no special container of heavy-gauge steel for the paint.

NO TEDIOUS PUMPING

Needing no pressure behind the paint, the Nel-Spot Back Pack eliminates pumping. Eliminates messy paint transfers too. A standard-size gallon paint can, just as it comes from the factory, *that* (and a more comfortable harness) is all there is to the Nel-Spot Back Pack.

AND REDUCES YOUR COST

The Nel-Spot Back Pack, using Nelson's specially formulated Tree Marking Paint offers these other positive economies

—time saved cleaning plugged guns—time saved stirring and transferring paint—no part-cans wasted—plus extra yield (more spots per gallon) and extreme durability (no remarking).

• • •

For ordinary day-to-day marking, of course, the Nel-Spot Quart Hand Gun—favorite tree marking tool for foresters all over the world—is still tops. (For latest improvements, see the new Model D-103).

Order Now—or for more details—Write Dept. JF

THE NELSON COMPANY

Iron Mountain, Mich. (Box 349) Montgomery, Ala. (Box 1892)

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partment of Agriculture as a plant pathologist at the Plant Industry Station, Beltsville, Md.

Meteorologist Named for Portland Office

Howard E. Graham, meteorologist with the Weather Bureau in Washington, D. C. since 1956, was transferred to the Portland, Ore., office of the U. S. Forest Service.

Graham will be assigned to the Division of Fire Control and will work with Weather Bureau fire-weather forecasters in a new weather forecasting arrangement being set up by the Forest Service and Weather Bureau in the Forest Service Regional Office in Portland.

Graham served as fire-weather meteorologist in the Portland office of the Weather Bureau from 1946 to 1956. Prior to that time he did weather forecasting for the Navy in Alaska during World War II.

In addition to forecasting, Graham will also train Forest Service fire control men on the National Forests of the Pacific Northwest Region in interpretation and use of fire-weather forecasts and in locating weather recording instruments to better sample actual forest conditions.

Allied

Harrar Heads Forest Products Research Society

Dr. E. S. Harrar, dean of the Duke University School of Forestry, Durham, N. C., assumed the presidency of the Forest Products Research Society at the organization's annual national meeting in San Francisco, June 28-July 3.

Outgoing president W. Jeter Eason of Memphis, Tenn., turned over the gavel of office to Dean Harrar who arranged the technical program of the meeting. With almost 100 papers presented and an attendance of 1,000, the program was the largest in the society's history.

A charter member of the organization, Dean Harrar was elected to the vice presidency in 1957. In 1954, he was elected to represent the Southeastern Region on the society's executive board. He also served as chairman pro-tem in the organization of the Carolinas-Chesapeake Section in 1948, and was a trustee and secretary-treasurer of this section for several years.

Forestry Employment

S.A.F. members are privileged to insert one 60-word advertisement in this column without charge. Forest industries desiring to employ foresters may insert advertisements at the rate of $4 per column inch. Copy must be received by the end of this month for an advertisement to appear in the issue after next.

Obviously the Society cannot assume responsibility beyond making it possible for prospective employee and employer to enter into negotiations.

Positions Available

POSITION AVAILABLE

Experienced timber buyer needed to supply white oak requirements for whiskey barrel stave and heading manufacturer, located in the Middle Atlantic states. Operations cover several states and involve dealings with land owners and log producers. Applicant should be thoroughly familiar with white oak timber and free to travel. Liberal salary plus expenses.

Eppler Wood Products Corp.
P.O. Box 12, Dorsey, Md.

Full-time research position to develop a research program in wood technology and products at Midwest forestry school. Ph.D., required. Properly qualified person to be appointed at professor grade.

Box J, Journal of Forestry, Mills Building, Washington 6, D. C.

Positions Wanted

Tropical forester. Graduate forestry work at Duke and Yale. Age 43, married, four children. Experience: timber surveys, type mapping, extension and farm forestry for U. S. government in Puerto Rico and Virgin Islands; field exploration and administration throughout Panama in conjunction with natural rubber procurement, also for U. S. government. Since 1945 forester for the West Indies Sugar Corporation in Dominican Republic and Cuba, establishing tree nurseries and reforesting submarginal agricultural lands with eucalypts and other subtropicals and tropicals.

Box G, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, M.F., Duke 1959. Single, age 24. Training includes concentration in silviculture and management; surveying, mensuration, economics, harvesting and processing, protection and allied subjects. Graduate work includes soils and soil fertility. Interested in most phases of forestry. Summer employment with National Forests and Experiment Station. Prefer industrial forest management, utility company, or state organization.

Box H, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S., Purdue Univ., 1957. Age 29, single, veteran. Fluent in Spanish. One and a half years with U.S. Forest Service in New Mexico including timber sale supervision, work on public recreation areas and general ranger district experience. Desire employment with consulting forestry firm specializing in tropical forestry, preferably in Latin America.

Box I, Journal of Forestry, Mills Building, Washington 6, D. C.

B.S.F., Syracuse, 1936, with graduate study. Married, family. Experience: 14 years cruising, marking, scaling logs and lumber, trail construction, pest control, T.S.I., and reforestation with maximum 20 men. 9 years public relations and education. Some research, nursery and greenhouse work. Personal study of photogrammetry. Desire to locate with southern industry.

Box K, Journal of Forestry, Mills Building, Washington 6, D. C.

Today's smallest two-way mobile radio - actual size!

New General Electric Transistorized Progress Line

General Electric's new Transistorized Progress Line will fit in more places, in more different positions, than any other two-way mobile radio you can buy today.

Not only is this the world's smallest, lightest commercial two-way mobile radio, but standby battery drain is so low you need never turn off your TPL mobile unit, just like the clock in your car. You install no special generator, use less gas, require fewer engine jobs.

TPL is the first two-way radio that transmits up to 75 watts of power in high band . . . the first that really fits under the dash . . . the first to realize the full benefits of transistorized design (no more than four tubes) . . . the first to eliminate bulky cables through new one-piece design of receiver control and transmitter . . . the first with shielded dirt-free ventilation.

The new General Electric TPL ushers in a new era of convenience and reliability in mobile communications. Don't miss all the exciting details. Write General Electric Company, Communication Products Department, Section 3999, Mountain View Road, Lynchburg, Virginia.

GENERAL ELECTRIC

Communication Products Department

Another User Testimonial for Homelite...

"My Homelites give the kind of service a woodsman likes"

Mr. D. T. Hayes has a logging and paper wood operation in Kellyton, Alabama. His profits depend on having chain saws that will give him consistent, dependable operation. That's why he chose Homelite.

The new Homelite 9-26 is the most powerful saw in the Homelite line. It's the first *all-new* gear-drive chain saw designed for the professional woodcutter! From its streamlined outward appearance to the new design of its famous Homelite engine, the 9-26 is *new* clear through. Many new features save you time and money — dual control chain oiler for finger-tip oiling with either hand; new centered bar and pistol grip, perfectly aligned to help you fell a tree exactly where you want it. For quick, on-the-job service, just loosen one captive wing nut and the entire engine shroud is easily removed. A choice of gear ratios — either 2.8 to 1 or 3.5 to 1.

PROOF — Mr. Hayes writes: "We are now running five Homelite Chain saws. All have, and are giving, the kind of service a woodsman likes." Ask your Homelite dealer for a free demonstration of the new 9-26. And while you're there, ask to see the *full* line of Homelite high quality chain saws. You'll soon see why Mr. Hayes and thousands of other professionals insist on Homelite for dependable, *profitable* wood cutting!

9 26

As little as $7.10 weekly* after small down payment

- **fells trees up to 10 feet in diameter**
- **only 26 pounds (less bar and chain)**
- **straight blades 18" to 60"**
- **16" plunge-cut bow, clearing bar**

HOMELITE

A DIVISION OF TEXTRON INC.

4109 RIVERDALE AVENUE, PORT CHESTER, NEW YORK

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